

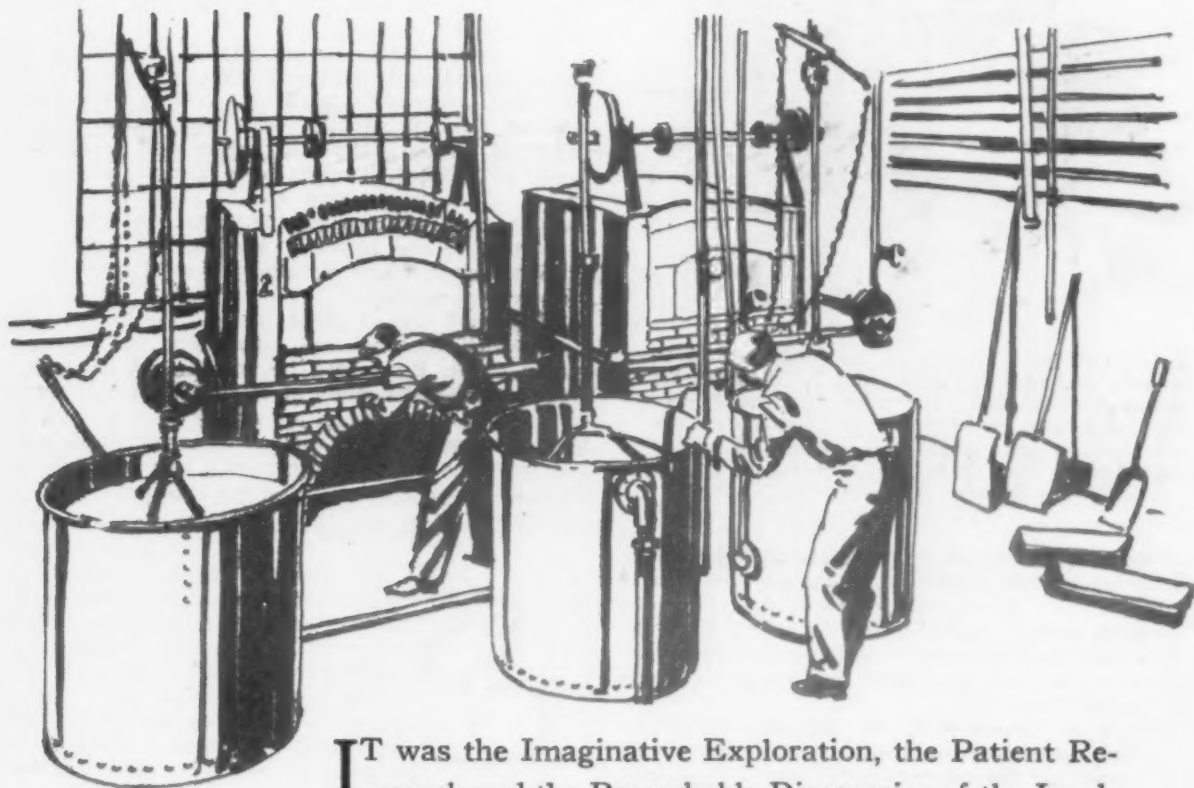
THE IRON AGE

New York, September 3, 1925

ESTABLISHED 1855

VOL. 116, No. 10

The Story of Steel Treating



IT was the Imaginative Exploration, the Patient Research and the Remarkable Discoveries of the Leaders in Metallography That Gave Heat Treatment Its Commanding Place in the Steel Industry of Today

BY PRENTICE WINCHELL

A FOREST fire roaring against a hillside of iron ore; a primitive man stumbling upon a rivulet of molten metal—this is the traditional legend of the discovery of iron. Whether iron was first found by such a circumstance or not, there can be little doubt that the first practice of heat treating came about by accident.

It is not easy, however, to reconstruct the process by which the delicate art of tempering originated, yet long before the first page of written history, tempering had been developed into a fine art.

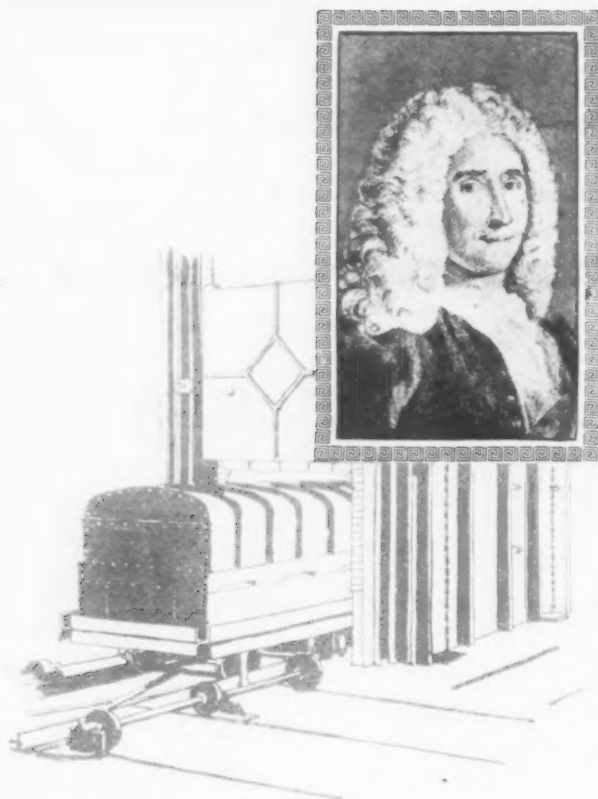
The laws of the Medes and the Persians were enforced with swords of tempered steel; the Assyrians built their temples and palaces with tools of fine temper. As proof of the early expertness of workers in iron and steel, there are tools in the British Museum more than 3000 years old and they are made of tempered steel.

In Homer's time, not later than the ninth century, B. C., quenching was so well known that the poet used as a simile the hissing of steel when it is quenched in water. Herodotus, in the fifth century, B. C., speaks of the Chalybians, who are supposed to have invented

the art of converting iron into steel, and Pliny the Elder, writing in the first century B. C., said: "Howbeit, as many kinds of iron as there be, none shall match in goodness the steel that cometh from the Seres" (the Latin name for the Chinese). The Chinese and Japanese were not the only Orientals versed in tempering for the fame of Indian steel has come down to us from the earliest days.

Pliny the Younger (A. D. 23-79), records that "it is the practice to quench the smaller articles made of iron with oil, lest by being hardened in water they should be rendered brittle. Iron is not in a fit state for being hammered when it is red hot, nor indeed until it has begun to assume a white heat."

The manufacture of fine steels in early times centered about certain rivers, the waters of which were supposed to impart some special quality to the metal during the tempering process. Thus Damascus and Toledo became famous for their sword steel long before the Christian era. The Romans and later, the Moors, laid great store upon their weapons of Damascus steel. Nor is this to be wondered at, for those examples of the swordmaker's art which are known



René Antoine Ferchault de Réaumur, of Paris, chemist and physicist who about 1715 started his researches into the properties of metals, later studied Damascus steel and first enunciated the principles of annealing and tempering, as well as contributing largely to the first knowledge of cementation and carburizing

to us today as having come from Damascus give ample evidence of a high degree of technical skill in heat treating.

In fact, there is good reason to believe that the modern development of steel treating came about indirectly as a result of this same Damascus steel. It happened in this fashion:

Around the operations of manufacturing the Indian "wootz" or crude crucible steel, the craftsmen of the East threw a veil of deepest secrecy. Especially guarded was the method of forging and tempering the Damascus blades necessary to produce the exquisite markings and remarkable toughness for which it is famed. But as these swords were of such a superior quality, the warmakers of other lands became exceedingly desirous of penetrating the mystery and discovering the process which produced such weapons. The fortunes of war and the demands of conquerors soon scattered specimens of the armorer's art into the four corners of the earth and it was inevitable that craftsmen of other countries should attempt to duplicate them.

The first recorded attempt to study the methods of the East was that of René Antoine Ferchault de Réaumur, the famous French physicist of the first half of the eighteenth century. This philosopher, having received from Cairo some specimens of Damascus steel, could find no smith in Paris able to forge them. He declared that it must be the fault of the workmen for the Orientals undoubtedly worked this same steel.

Many other investigations followed, all having for their purpose the discovery of the methods by which the artisans of Damascus had produced such remarkable steel. So closely was the secret guarded that apparently the members of the craft themselves began to lose the skill of their fathers and the imported steel began to assume a quality inferior to that of earlier days.

About 1820 one Bréant, then examiner-general of assays at the Royal Mint in Paris, undertook the study of Damascus steel and presented a paper upon the subject to the Academy. He had carefully analyzed the

samples which had come into his hands and propounded a classification of the various specimens into three groups. Bréant had very few of the advantages possessed by the modern metallographist in the way of scientific apparatus, but it is striking to note that his classifications correspond, according to Belaeiew, very closely to the hyper, hypo and eutectoid classifications defined by Howe.

Still another investigator took up the search for the lost art. Major-General P. Anosoff, engineer of mines and director of the Zlatoust Steel Works in the Ural district of Russia, decided to experiment until he had discovered the secret. He gathered information regarding the Oriental methods from Persian tradesmen and engaged in a long period of experimentation. Following in the path of Bréant, he worked with alloy steels and when unable to determine the characteristics of the metal with the naked eye, had recourse to his microscope. From 1831 until his death, Anosoff practiced, for the first time, the principles of scientific metallography.

But events were moving rapidly in Europe and other matters claimed the attention of workers in iron and steel. Anosoff's work was lost to view and if another Russian scientist and investigator had not happened, in the sixties, to pay a visit to the steel works at Zlatoust, it might have been completely forgotten. This chance visit was to prove of great importance to metallurgy, for the visitor was Prof. D. K. Tschernoff of the Imperial Academy of Artillery at St. Petersburg, whose influence on steel treating was to prove far-reaching.

Tschernoff took a great interest in the investigations which Anosoff had undertaken and upon his return to St. Petersburg he at once set to work to make a systematic study of steels. This was not his first research into the nature of steel, but it did result in a quickened interest and an enlarged vision which had much to do with Tschernoff's profound influence upon the modern science of steel treating.

The First Investigators



SO important a metal as steel could hardly escape attention by early philosophers and there are many isolated instances of discoveries regarding its properties from the seventh century on. Gilbert in 1600 noted that when a magnet is heated to red heat it loses all trace of magnetism. Faraday experimented with alloy steel in 1721 "with a view to improvement."

Réaumur described the structure of iron and steel as seen by an examination of fractures as early as 1722 and developed the first theories of hardening and annealing. Moreover, he gave his discoveries freely to the public—a thing which was, up to that time, quite unheard of in the scientific world. Men guarded trade secrets with their lives and Réaumur's voluntary explanation of the phenomena of annealing was an innovation.

Rinmann, of the University of Upsala, Sweden, wrote, in 1774, upon the characteristics of steel and drew some conclusions regarding the effect of carbon upon its composition. The feud between the adherents of Priestly, the discoverer of oxygen, and the philosophers of the phlogistic school resulted in some peculiar statements concerning the nature of steel which would hardly seem sensible today.

But, in 1786 Vandermonde, Berthelot and Morge reported to the Academy of Sciences that the distinguishing factor in steel was carbon. Guyton de Morveau had pointed out the part played by carbon in transforming iron into steel as early as 1737, but the matter continued to be controversial material until about the end of the eighteenth century.

Yet all this early theorizing was spasmodic and seldom sustained long enough to be productive of practical results. Nevertheless, there was a steadily growing need for a better knowledge of the structure of steel. It was the lack of proper apparatus for investigation that hampered progress.

History credits Galileo with the invention of the

microscope as distinguished from a mere magnifying lens, and if this is true, the world of metals owes a debt of gratitude to this persecuted philosopher. For it was to the microscope that steel treating, in a scientific sense, owed its birth.

Although Robert Hooke, in his *Micrographia*, described in 1665 the appearance of the edge of a razor under the lens and through Réaumur in 1722, and Widmanstätten in 1808, had examined metals and minerals under the microscope, no systematic study was made until 1863. In that year Henry Clifton Sorby, then a student of geology and mineralogy at Sheffield, England, began a research into the application of the microscope to the problems of metallurgy and thus became the recognized founder of the science of metallography.

Within a year he had achieved surprising results and proceeded to deliver a paper before the Literary and Philosophical Society in Sheffield, "On a New Method of Illustrating the Structure of Various Kinds of Blister Steel." This was followed immediately by his famous contribution to the (British) Iron and Steel Institute "On Microscopical Photographs of Various Kinds of Steel." Charles Hoole aided Sorby in the preparation of the photomicrographs.

Important as this step in the study of metals was eventually to prove, it received little attention at the time. Discussion in the institute was perfunctory; interest in the practical world was nil. Not unnaturally, Sorby turned his attention in other directions.

But there were a few scientists who saw in the new method the basis for such an examination into the nature of metals as had never been made before. Probably the first to build upon the foundation which Sorby had prepared was A. Martens, director of the royal mechano-technical experimental station at Charlottenburg, Germany. Fourteen years after Sorby's memorable contribution, Martens published a paper "On the Microscopic Investigation of Iron." He went further than his predecessor in correlating the application of the microscope with the study of fractures and visual characteristics.

Another pioneer in this new field was Floris Osmond, at that time engaged in the Le Creusot Works in France. With a colleague, Werth, he began to investigate the possibilities of the microscope in opening new worlds of interest to the metallurgist. At about the same time J. C. Bayles (who was editor of *THE IRON AGE*, 1869-1889), was urging the adoption of microscopic tests to support physical and chemical analysis.

Sorby had begun his work with iron and steel as a result of mineralogical studies . . . "It was a natural thing that I should be led from the study of the microscopical study of rocks to that of meteorites, and in order to explain the structure of meteoric iron I commenced the study of artificial iron" . . . he says in his memoirs. During the twenty years that followed the presentation of his first paper, he continued his mineralogical work, doing practically nothing in regard to the study of iron and steel. It is likely that he became aware of the renewal of interest in his work after this length of time because he lectured on the subject at Firth College, Sheffield, in 1882. Nothing of great importance was added to the fund of knowledge then existing, however, and for three more years the progress was slow.

Then came a remarkable discovery. The development of microscopical technique and the improvement in the construction of lenses, enabled Sorby to employ for the first time, a relatively high power of magnification. A power of 50 linear had, in his experiments up to this time, showed about as much as one of 200.



Robert Forrester Mushet, of Sheffield, England, who in 1868 accidentally discovered an air-hardening steel containing tungsten, conducted a series of experiments in connection with alloy steels, manufactured them into tool steel at the Clyde Works in Sheffield and paved the way for Taylor and White in the search for high-speed steel

But with the application, in 1886, of a magnification of 650 diameters, he saw "a structure of an almost entirely new order" which he called "the pearly constituent." The iridescence of this constituent which we know as "pearlite" after Sorby's description, was due to fine straight or curved parallel lines caused by alternating thin sheets, one set harder than another. After some study of this new constituent he concluded that the softer plates were iron free from carbon, while the hard plates consisted of carbide of iron.

The work which Sorby began so well was carried on with the stimulation of a growing need for more information concerning the various properties of steel and Wedding, Osmond, Martens and Tschernoff contributed largely to the new science which about 1892 was given the name "metallography."

That Sorby appreciated the importance of his discovery is apparent by his remarks in concluding the 1886 paper: "Even if some of my conclusions have been founded on insufficient data, the methods of research adopted are adequate to clear up some of the most complicated questions in metallurgy."

And there were problems to be cleared up! Those were the days when John Ramsbottom, chief engineer of the London & Northwestern Railway, was urged to specify steel instead of iron for rails. To Henry Bessemer, who made the request, Ramsbottom replied, "Mr. Bessemer, do you wish to see me tried for manslaughter?" Those were the days when steel boilers were sold with instructions to heat and cool them gradually to avoid harm to the metal; when the Board of Trade grudgingly admitted steel to the list of recog-

"Iron seemeth a simple metal, but in its nature are many mysteries and men who bend to them their minds shall, in arriving days, gather therefrom great profit, not to themselves alone, but to all mankind."

—Joseph Glanfield, 1650.

nized materials, granting it a tensile strength of 6½ tons per square inch; and when even the steel makers were uncertain as to just what constituted "quality" in steel.

The Bessemer and Siemens-Martin processes soon were struggling for supremacy. Much poor steel was being made because the methods of production were but poorly understood. Governments refused to adopt steel for ships. Bridgebuilders hesitated to employ steel for their projects.

And then metallography came to the rescue with a simple and comparable method of determining the structure and character of various steels. Not that the manufacturers of those days thought the new-fangled science was simple . . . it was far too complicated for them. But as improvements in the method were made and as the store of information regarding photomicrographs increased, metallography slowly began to be of practical importance in the industrial world.

One of the chief uses for the microscopic examination of iron and steel, during the last decade of the

material that I may torture it to my heart's content." He sent samples to a metallographist.

Making Heat Measurement Practical

But although investigators were now able to see "beneath the surface" of their metal, still the methods of examination were far from accurate. The most pressing need was for some sort of accurate and economical heat measuring device.

A reliable high temperature thermometer was badly needed. Josiah Wedgwood of Staffordshire . . . he who made pottery . . . had already constructed the first pyrometer. In a paper presented before the Royal Society in 1788, he said: "A measure for the higher degrees of heat, such as the common thermometers afford for the lower ones, would be an important acquisition, both to the philosopher and to the practical man. . . . In a long course of experiments for the improvement of the manufacture I am now engaged in, some of my greatest difficulties have arisen from not being able to ascertain the heat to which the pieces have been exposed."

Wedgwood's pyrometer consisted of several balls or cones of clay, the shrinkage of which, under heat, was supposed to be proportional to the temperature to which they were exposed. Some idea of their accuracy may be gained from the fact that by the aid of Mr. Wedgwood's little balls of clay, Dr. Lardner determined that cast iron melts at 17,977 deg. Fahr. and that iron welds at 21,000 deg. Fahr!

The air pyrometer came next, an inaccurate affair which depended upon the expansion of air under heat. Next came an ingenious instrument employing the difference of expansion of two metals. This, however, could not be relied upon to record accurately the temperatures above the red heat, at which point the metals tend to elongate permanently.

Perhaps the most practical of the early pyrometers was that based upon the supposition that the specific heat of metallic bodies is the same at various temperatures. Consequently, by measuring the heat of a ball of metal after it has been exposed to the temperature to be measured, the temperature could be calculated.

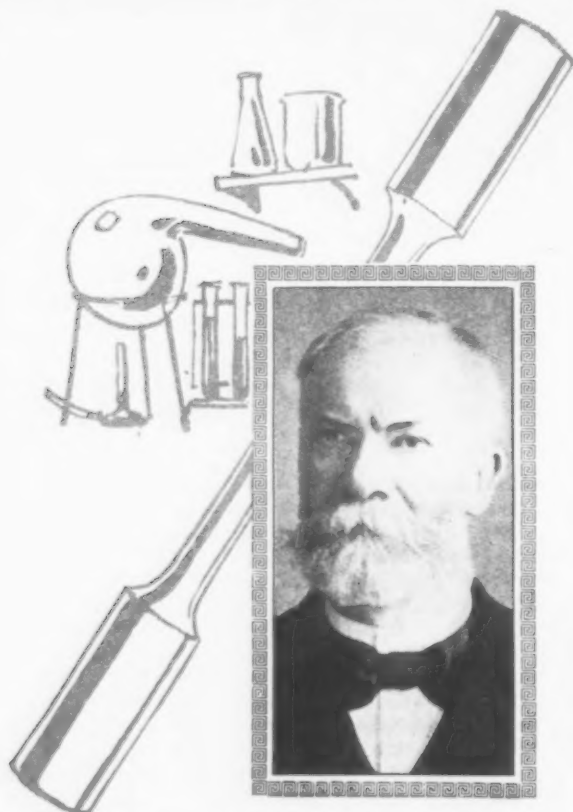
This was the principle of the Siemens water pyrometer, which found early acceptance in Europe and was in use in this country even after the beginning of the twentieth century. There were some reasonable doubts as to its accuracy and it eventually gave way to more scientific types.

One curious pyrometer which found wide use for a time was that based on the so-called dissociation of certain compounds at very high temperatures. The substance usually adopted was carbonate of lime, which, at a temperature above 1500 deg. Fahr. becomes separated into lime and carbonic acid gas. By measuring the pressure of the latter the user was enabled to estimate the temperature to which the limestone had been exposed.

Prinsep prepared a series of alloys of silver and gold and of platinum and gold with melting ranges from known temperatures ranging from 954 to 1775 deg. Fahr. Another type depended upon the melting points of certain chemical salts. In Germany a simple pyrometer was constructed of an iron bar about ¾ in. thick, through which rivets of zinc and copper were fastened for determining the expansion at various temperatures.

None of these was quite satisfactory. Inaccuracies, difficulty of interpreting results and expense of operation were some of the objections. But finally there came in the various pyrometers based on the thermo-electric properties of certain metals. The pure metals offer an increasing resistance to the passage of an electric current with each increase in temperature. This method permits of precise measurement but requires the employment of very fragile apparatus. Siemens, Callendar, Griffith, Waidner and Burgess experimented with and developed this type of pyrometer.

The instrument which has been most commonly employed in heat treatment is based upon the thermocouple principle. Though the principle may have been established by A. C. Becquerel, as some claim,

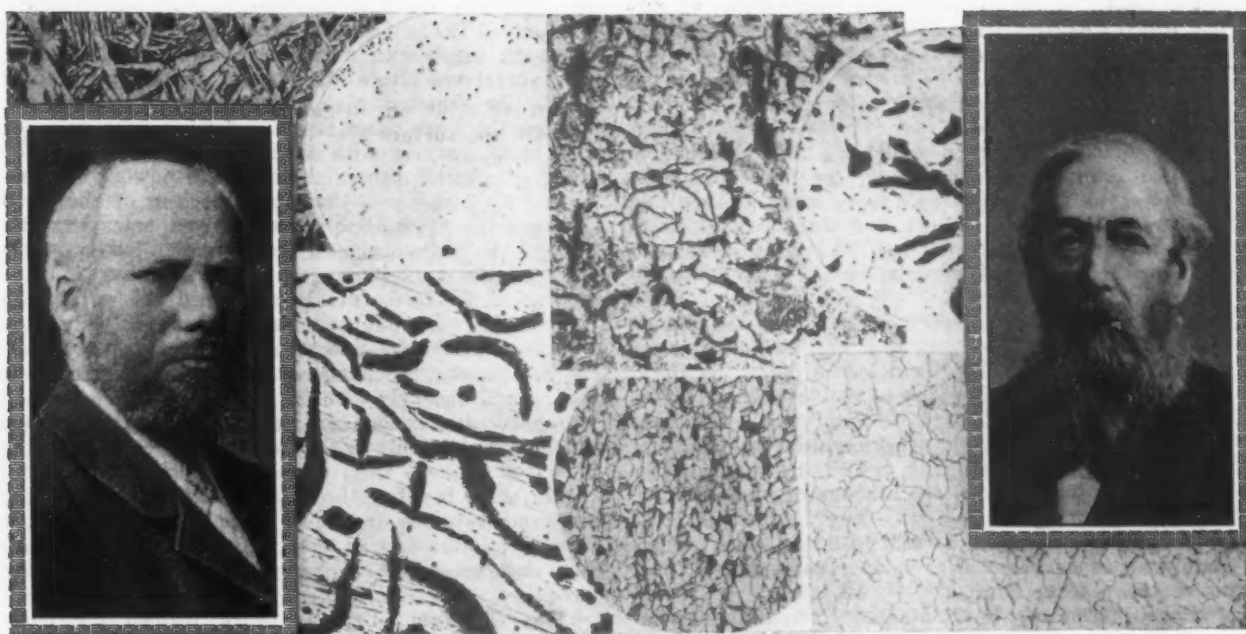


Dimitry Tschernoff, of St. Petersburg, who taught mathematics at the University there, followed Anosoff's steps in the study of Damascus steel, in 1866 took charge of the heavy forging department of the Oboukhoff Works and there conducted the first systematic researches into the relation between thermal treatment and the structure of steel and between the structure of steel and its physical properties

century, was the testing of armor plate. Ironclads had given way to steel clads about 1885 and the various methods of hardening armor plate were receiving a great deal of scientific attention. In Russia and France much effort was concentrated on gun materials and perhaps the fact that a large cannon used on the battleship *Alexandra Newsky* burst in 1867 with disastrous results may have had something to do with Professor Tschernoff's activity in iron and steel!

Prior to the introduction of the Bessemer converter and the open-hearth furnace, steel was used chiefly for tools, springs, farm implements and weapons. Now it was in demand for railroads, buildings, ships and guns.

And as manufacturers began to learn something of the strange dual life of iron and carbon, the attitude toward steel changed. Eventually Mr. Ramsbottom said: "Well now, let me have ten tons of this



Adolf Martens, of Charlottenburg, Germany, who was the first after Dr. Sorby to take up the microscopical examination of iron and steel in a scientific manner. He worked in a machine shop, later designed bridges, and in 1875 started his researches into the microstructure of steel, unaware of Sorby's work at the time. When appointed director of the newly founded testing laboratories at Charlottenburg in 1884 he found it impossible to continue his metallographic work, which was turned over to E. Heyn, a member of his staff. His contributions to the science are noted for the painstaking character of the data with which he supported his contentions (left)

Henry Clifton Sorby, of Sheffield, England, who early studied "mathematics, optics, chemistry, anatomy and water-color drawing . . . my training in all these things being of the

greatest possible value" in furthering his work with the microscope, which resulted in 1863 in the study of iron meteorites and finally puddled iron and steel, gave an account of it to the British Iron and Steel Institute, and 22 years later followed it with the application of what was then a high power of magnification and the discovery of the "pearly constituent which we know as pearlite." So great was the caution and so keen the observing power of this eminent microscopist that the foundation he laid for the new structure (of metallography), although thoroughly and critically tested, has been found to be of a most trustworthy character. Whatever has been accomplished in microscopic metallography has been done by following his footsteps. "To Dr. Sorby and to him alone is due the pioneer's honor," wrote Sauveur in 1900

it is certain that the first successful pyrometer using this idea was invented by Le Chatelier, whose work in this connection was epochal. Not only did he design and perfect the first practical heat-measuring instrument, but he also gave it to the world without any attempt at deriving profit from it. He was also responsible for the pioneer application of the optical pyrometer and is generally accepted as the founder of practical heat measurement. Callendar and Roberts-Austen also experimented with optical pyrometers with considerable success.

Concerning the Theories

One of the most prominent figures in the English commercial world, Isaac Lowthian Bell, of the North-eastern Railway, said in 1879 before the Iron and Steel Institute: "It is clear to me that there is something connected with the manufacture of steel to which I would call the special attention of steel makers, namely, that circumstances may take place which in point of fact may seriously impair the value of the material, and upon which chemistry affords no light—what these conditions are we can only guess at, as yet, but I would suggest that the molecular condition . . . is affected by the manner of cooling." Thus did a pioneer in steel testing recognize the need of more adequate knowledge nearly half a century ago.

The intense application of scientific energies to problems of the steel industry which marked the last two decades of the nineteenth and the first decade of the twentieth century was just beginning to make itself felt in 1880. The first organized research into the theory of iron and steel was undertaken in that year. A committee of the (British) Institution of Mechanical Engineers was convened to consider the

hardening, temper and annealing of steel. The members of this committee were all distinguished scientists and it is only necessary to note that the name of D. Tschernoff appears prominently upon the list. Few were the developments in steel treating from 1860 to 1900 that he did not actively further with his own energy and resources.

This committee pointed out that no attempt had been made to discover the theories of the constitution or the properties of steel until Karsten in 1827 investigated carbon. The committee considered Jullian's paper before the Academy in Paris, 1852, to be the next contribution to steel theory. The report of the committee covered the nature and composition of steel, the quantity of carbon in steel and cast iron, substances other than carbon entering into steel composition, the hardening of steel, the molecular changes which occur in hardening, tempering and annealing, and the directions in which further investigations were needed.

Surely the statement of the mathematician and physicist, Cardanus, in 1557, was indicative of the state of mind of most practical steel men during the early period of the development of steel treating. Cardanus says, "Steel is nobler than iron and exists in two forms, namely as steel and as native steel. . . . When it is well cleaned, then heated and quenched three or four times in equal parts of extract of radishes and water which has contained earthworms, it cuts iron like lead!"

A remarkable formula, to be sure, but few of the formulas presented before 1880 had much more meaning to the practical man in the mill.

Ledebur remarks that a theory of hardening based on facts could be developed only after it has been discovered that the carbon of hardened steel exists in a form different from that of the carbon of the unhar-

dened metal; or rather, only after that variety of carbon which was considered as single and that which was called combined carbon, was found to exist in two different forms, which may be present in widely varying proportions in the same steel, after it has been hardened or slowly cooled.

If the experiments on annealing which Réaumur made are eliminated, undoubtedly the first work done in regard to the hardening theory must be credited to Karsten in 1824 . . . just a century ago. Caron, Rinmann and others confirmed Karsten's work and in 1885 Abel succeeded in isolating the second variety of the combined carbon.

The next step in formulating a theory to account for the peculiar behavior of iron and carbon in steel was the discovery of the "recalescence point" by Gore. In 1869 he published his study of the "Molecular movements and Magnetic Changes in Iron" in the Proceedings of the Royal Society. The method employed was a wire stretched horizontally, which, by means of a series of levers, indicated the amount of expansion or contraction during heating or cooling. At a dark red, he found on cooling a greater dilation than immediately above or below that temperature, but did not notice the reverse effect during heating.

Four years later, W. F. Barret followed this paper of Gore's with a study "On Molecular Changes in Iron

on solidifying has a crystalline structure which may be prevented, (1) By simply reheating to a cherry red, when an ingot with a coarse structure will suddenly be transformed into a fine-grained and strong product, or (2) By hammering at a high temperature, and continuing the work down to a low temperature, to a certain point, varying with the nature of the steel, below which the metal preserves its whole powers of resistance. He also noted that rapid cooling of the metal destroys the crystalline structure and notes that the higher the percentage of carbon, the lower is the point at which no change in structure occurs.

Brinell, in 1886, further developed this crystalline theory of Tschernoff and stated that (1) Whenever steel loses its crystalline structure, other than by mechanical work, the change of texture will be found to occur simultaneously with the transformation of cement into hardening carbon or vice versa and the change will be complete only in the event of the carbon's being converted by heat from cement—to hardening carbon: (2) In order to effect the transformation of hardening into cement carbon, in a steel heated to a white heat, it must be allowed to cool slowly to a lower temperature than that necessary to change cement into hardening carbon.

This Tschernoff-Brinell theory formed the basis upon which steel was treated during the period from 1880 to 1898 when Stead's paper on the "Crystalline Structure of Iron and Steel" modified the theory somewhat. Stead pointed out that crystals should not be confused with granules, that grains formed in the solidification of liquid metals are large or small according to whether the freezing is rapid or slow, that the smaller and finer the grain the safer the structure, and that iron crystallizes in the cubic system.

Allotropists versus Carbonists

In 1885 Osmond and Werth published their paper on "The Critical Points of Iron and Steel," which formed the basis for the allotropic theory of hardening. Osmond's conclusions were that "Hardened steel is a steel in which the iron and carbon have preserved more or less completely in the cold the condition which they possessed at high temperatures. The heat of the change that has not been effected remains disposable in the metal and may be termed the latent heat of hardening. I conclude that the hardened steel owes its properties principally to the presence of β iron, which is hard and brittle by itself at ordinary temperatures. Carbon in the state of carbon maintains iron in the β state during slow cooling down to a temperature which is in inverse proportion to the amount of carbon contained in the steel. The influence of the carbon is of the same character as that of the rate of cooling and both combine to produce the final result."

Osmond was undoubtedly the first to formulate the allotropic theory, but there were many others who were working along similar lines at this time. A. Mathieson, in a paper presented to the British Association for the Advancement of Science in 1863, had referred to the "solution theory of steel."

George E. Woodcock of Sheffield, England, in "The Mutual Relations of Carbon and Iron," presented in 1882 before the (British) Iron and Steel Institute, announced that the carbon of steel (1) is in a state of "simple absorption" in the iron; (2) that the hardening of steel is due to a metamorphic change in the condition of the carbon which then assumes a crystalline form closely analogous to the diamond. Stead showed that the so-called "diamond theory" would hardly hold water, since steel was completely soluble in acids which would not dissolve diamonds. Martens in Germany and M. Caron in France were other pioneer investigators into the nature of steel about this time.

In the years immediately following the presentation of Osmond's famous paper, the allotropic theory was generally accepted and many metallographists made experiments which seemed to justify the ideas that Osmond set forth.

But there were a few who differed with Osmond, and gradually there grew up in the international scientific community which was devoted to the study of iron and steel a school of adherents to the "carbonist" theory.



Floris Osmond, of Paris, who studied metallurgy, worked in a machine shop, helped to start the open-hearth furnaces of Denain and Anzin, joined the metallurgical staff of the Creusot Works and there met Werth, with whom he collaborated in metallographic research. He was thus the third scientist to take up the microscopic examination of steel. The name of Osmond "is intimately connected with each progress accomplished in metallography and it may be affirmed that no other investigator has contributed so much as he to the advancement of the science," said the Editor of the "Metallographist."

Wire at Low Red Heat" which contained the exposition of the reverse effect during heating.

In 1880 Hogg stated that quenched steel showed less carbon (using the Eggertz color test) than the same steel annealed.

Abel and Mueller succeeded in isolating iron carbide, Fe_3C , about this time.

Tschernoff published his famous study on the structure of cast steel ingots in 1880 and stated that steel

Metcalf and Langley gave a concise summary of this opposing view. No emphasis is laid on the fact that iron can exist in several allotropic forms. Hardening, according to the "carbonists" was due to the enforced solution of the carbon in iron by sudden cooling, the hardness being a direct function of the rate of cooling. Hardening is accompanied by great internal strains and the molecular stresses produce hardness in a manner not dissimilar to that of cold working.

As the allotropic school continued to voice their opinions, the "carbonists" became openly antagonistic and there followed one of the most famous scientific controversies in history.

The alloys research committee of the Iron and Steel Institute presented a report which favored the allotropic theory. Sir Roberts-Austen, a close friend of Osmond and a firm believer in the correctness of his opinions, was immediately assailed by Arnold and Hadfield, backed by a number of scientists in France, Belgium and Germany.

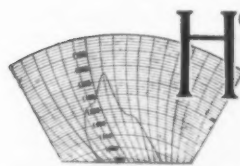
Lengthy and violent discussions were held, the press became interested and the metallographist who did not attempt to contribute his influence in one way or another to either "allotropists" or "carbonists" must have felt like the small boy who was left home while the family went to the picnic.

In accordance with his belief in the allotropic theory, Roberts-Austen sought for additional proof of its validity and enunciated the law that "The influence of elements in iron is in accordance with the periodic law, i. e., the smaller the atomic volume, the greater the power of hardening. Arnold immediately undertook a long series of experiments using nearly pure iron and many of the elements, with a view to disproving the periodic theory.

From 1890 to 1900 the development of the various theories came so thick and fast that one opinion would hardly be in type before a dozen were ready to oppose it, and any consideration of the multiplicity of views then current would only add confusion to uncertainty.

It is important, however, to note two things; (1) that the theoretic controversy temporarily weakened the belief of practical steel men in the utility or value of metallographic methods and (2) that the very intensity of the disagreement led to the development of rapid improvements in the methods of preparing and etching specimens, higher magnifications, better photographic apparatus and more scientific approach to the problem. It is also worthy of note that it was during this period that American contributions to the science first came into prominence through the work of such men as Albert Sauveur and H. M. Howe. In Europe, Akerman, Le Chatelier, Moissan, Curie, Pionchon, Kohlrausch, Hopkinson, Hadfield, Newell, Knott, Hatfield, Bell, Woodcock, Heyn, Wedding, Law, Stead, Levy, Matweiff, Guillemin, Ewing and Rosenhain are the names which may be inscribed on the roll of fame, which is so properly headed by Tschernoff, Sorby and Osmond.

The Physicist Lends a Hand



HOWEVER, it was not until 1899, when Roberts-Austen first plotted the famous iron-carbon diagram, that the various theories concerning the structure and behavior of steel at different temperatures began to be consolidated. The carbon-iron diagram was immediately recognized as a contribution of the very first importance and has indeed proved to be such.

Roberts-Austen's work was promptly followed by a number of important papers dealing with the freezing phenomena of molten steel and the action of the various constituents. The most important contribution was that of Bakhuis Roozeboom, a celebrated physicist, who applied the phase doctrine first announced by Willard Gibbs, professor of physics at Yale University in 1878, to the diagram of the iron-carbon solutions suggested by Roberts-Austen. This phase doctrine application was, perhaps, somewhat like the Einstein theory of relativity in abstruseness, and perhaps was a little puzzling to some members of the institute at the time



Henry Le Chatelier, of Paris, who was first a mining engineer and afterward a professor of chemistry, made possible much of the development in steel treating by his improvements in pyrometric apparatus, his invention of the thermo-couple, the optical pyrometer, and his thermal theories, and first showed that the fusibility curves of metallic alloys were similar to the freezing curves of aqueous saline solutions or mixtures of melted salts, thus laying the groundwork for Roberts-Austen and Roozeboom; about 1900 made extensive examinations into the structure of steel with regard to correlating the then existing theories of hardening and tempering; a notable contributor to the metallographic science

it was delivered in 1900, but it was, nevertheless, of major importance. It had already proved its usefulness in solving other problems, states Roozeboom, and its purpose was "to find out the conditions of the existence of the phases of a system of one or more components—in this case iron and carbon." That it did aid in the understanding of the complex actions of iron and carbon is a matter of record.

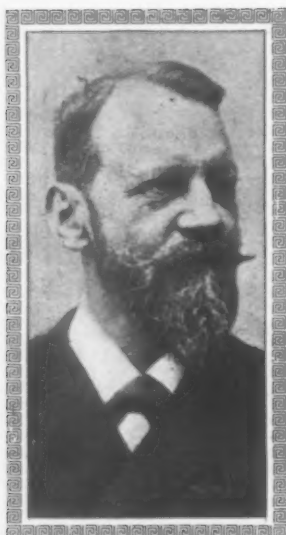
One of the most valuable contributions to the young science was in the consideration of nomenclature. With each discovery of a new constituent there came the possibility of confusion regarding terminology. Professor Howe was probably responsible for the consolidation and clarification of terminology to a greater extent than any other metallurgist; it was he who gave the name ferrite, cementite, pearlite, austenite and sorbite. Osmond suggested the name martensite as a tribute to the early work of Martens. Heyn suggested the name osmondite for one constituent, though it does not appear to have gained very general acceptance. Sauveur suggested steadite, Benedicks, ferronite.

Prominent among developments in recent years is the slip interference theory of hardness promulgated by Jeffries and Archer, a theory which has gained wide approval.

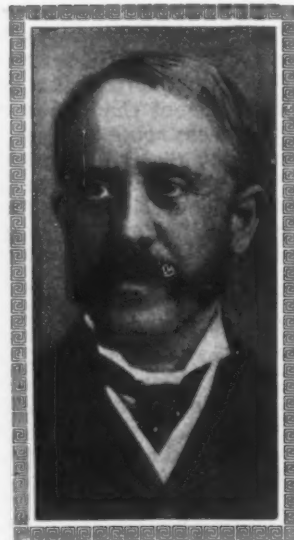
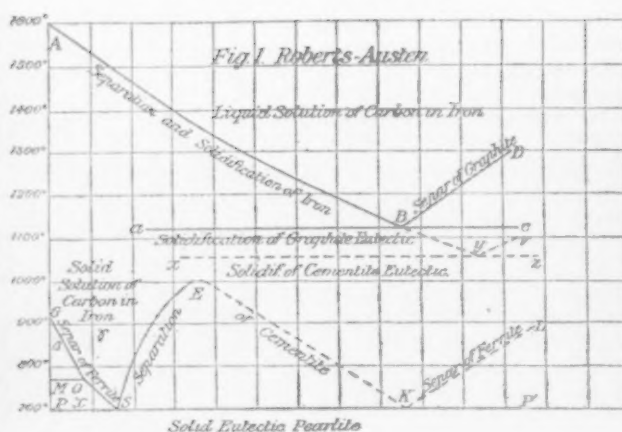
In addition to consolidating the attitude regarding the names of various iron-carbon compounds, Professor Howe accomplished a great deal of good in coordinating the work done by his numerous European contemporaries, conducting original researches and developing the various iron-carbon diagrams.

Testing Apparatus Is Improved

It seems evident that testing methods have been in existence as long as the metal which they are designed to prove. From a Syriac script found in one of the tombs in the recently unearthed but very ancient city of Tyre, we learn that one of the first testing instruments was a large and healthy slave. "If with one swing and stroke of the right arm the sword



Baron Hans Freiherr Jüptner von Jonstorff, professor of chemical technology in the Royal Technical College at Vienna and chief chemist of the Oesterreich-Alpine-Montan-Gesellschaft, Donawitz, Austria, whose contributions to the study of critical temperatures and whose work in connection with the phase doctrine application of Roozeboom place him high in the ranks of those who have contributed to the science of steel treating



Sir William Roberts-Austen, of London, probably the world's best-recognized authority on gold coinage and an indefatigable worker in metallurgy, one of the leaders on the famous Alloys Research Committee of the Institute of Mechanical Engineers, to whom steel treating owes a debt of gratitude for his first presentation of the iron-carbon diagram which has been the base of so much subsequent study

severs the head of the slave from his body and display not nick nor crack, and if the blade may be bent round the body of a man and break not, it shall be accepted as a perfect blade."

Early tests were made with the unaided eye. Steel was graded according to the amount of bending or

hammering it would stand. A good steel bar was one that would bend into U-shape without breaking. The theory was generally held that the hardness of a steel was proportionate to the angle at which it breaks when bent. Fine distinctions between surface hardness, resiliency, brittleness, ductility or malleability were unknown.

Brinell's work in developing a hardness tester was, so far as is known, the first to achieve marked success. In connection with his work on tool steel, he developed, about 1900, together with Dillnar, the first design of a machine which was eventually to enable metallographists to make practical shop application of their laboratory experiments.

A German investigator, Wöhler, had made some preliminary experiments on the hardness as well as the fatigue of metals, between 1860 and 1870. Fairbairn is also credited with extensive researches in regard to impact tests, but the first recorded study is that of Spangenberg and Bauschinger about 1870. Other early testing devices were the Barba and LeBlanc spring tup, Fremont's spring pressure tup, Foepple's method of pressing together under a constant load two pieces of the same metal, Ludwik's use of cones instead of balls in the Brinell fashion, and Guillery's rotating weight test. Marché of Paris wrote on the mechanical testing of steels in 1878, summarizing most of the work that had been done up to that time, and Knut Styffe also aided in the correlation of the first testing machine results. It is interesting to note, in view of recent developments, that Casperson in 1890 attempted to determine the hardness of steel by passing through it an electric current of known density comparing the results with other tests made on pieces of known strength.

Elaborate elongation test machines were designed and patented in many foreign countries as well as the United States prior to 1900. As early as 1875 the United States had paid what was said to be "an enormous sum" for a 400-ton testing machine devised by A. H. Emery and built by the Ames works in Chicopee. But exact and informative tests in regard to other qualities of steel than the tensile strength were not forthcoming so soon.

An unusual development in testing devices took place from 1895-1905, in part the result of the organization of an international committee on testing methods calculated to make possible the rapid exchange of views regarding the best practice to pursue. This



John E. Stead, of Middlesbrough, England, who devised many new methods for speeding up the etching, polishing and photographing processes and whose masterly papers on the crystalline structure of iron and the brittleness caused in soft steel by annealing have added much to our knowledge

of the constitution of iron and low-carbon steels, while his admirable investigations dealing with the microscopical detection of those constituents in which the phosphorus present in iron and steel segregate greatly enhances the practical value of the microscope in the laboratory of today

international organization was the outgrowth of the work of Professor Bauschinger, and led to the formation of the International Association for Testing Materials, which held its first convention at Zurich in 1895, and one in the United States in 1913, but which is not now functioning.

Two of the outstanding developments in testing during this important decade were the publication of a paper entitled "New Experiments on Shock Tests and on the Determination of Resilience," which George Charpy and Andre Cornu-Thenard presented at Paris, and the appearance in 1900 of Marten's monumental work on the "Principles of the Standardization of Methods of Testing," in which he sought to reconcile the results obtained up to that time with the theories then existing.

The scleroscope method of testing devised by Shore and Breuil came into being shortly after Brinell's apparatus. Various other dynamic indentation machines were originated about the same time, chief among which may be mentioned the Pellin, Ballantine and Keen apparatus, and later the Rockwell machine, which has lately been gaining wide application.

Various so-called "scratch" methods were invented to measure abrasive hardness, Marten's diamond scratch test and Turner's sclerometer being the first in this field. The Charpy impact machine was followed by Fremont, Russel, Izod and Seaton; several multiple impact testers were designed by Breuil, Yarrow, Seaton and Jude, Brinell, Ruelle and Stanton.

Stead, Sankey and Amsler-Laffon produced apparatus for determining fatigue resistance by alternate continued bending; Arnold originated a fatigue testing machine employing vibration. Dr. P. H. Dudley's stremmatograph, the schisephone based on Hughes' induction balance and others are but illustrations of the



Georges Charpy, of Montluçon, France, who published in 1892 an important paper on the theory of steel hardening for which he received a generous prize from the Société d'Encouragement pour l'Industrie Nationale; who became in 1898 chief engineer of the Compagnie des Forges de Chatillon at Montluçon, and there developed the testing apparatus which bears his name. Metallographic science owes much to this chemist-engineer



John August Brinell, of Fagersta, Westmanfors, Sweden: draftsman, engineer, chemist, inventor, student, scientist, to whom the steel treating fraternity owes much of its present knowledge concerning the fundamentals of steel testing and whose hardness tester has earned for him a degree of fame which has somewhat overshadowed his researches into the theory of hardening and tempering, which rank among the most important in this field

remarkable application which metallurgical and physical sciences have devoted to material testing in the last twenty years. Within the last decade many new and improved machines for testing steel have been patented, and as the need for more accurate knowledge of steels increases more will doubtless be adopted.

The Coming of High-Speed Steel

Robert Mushet, of Sheffield, had learned in 1868 that a piece of tool steel which had accidentally cooled in the air was as hard as some of those which had been carefully quenched. Mushet was more than a metallurgist—he was a scientist in the truest sense of the word. According he set out to discover why this particular piece of steel acted as it did. He found that this steel contained tungsten, a metal of which little was known at that time. He continued his experiments until he had evolved an alloy which would stand up under machine speeds double those in use with carbon steels. This new alloy was known as air-hardening or self-hardening steel.

And for about twenty years the matter of tool steels rested right there. Mushet's work was not followed up with a view to perfecting tool steels. New alloys were invented, to be sure. Hadfield's origination of manganese steel, Arnold's research into the properties of vanadium alloys and many other investigations greatly widened the field of alloy usage during this period. But tool steels were about where they stood when Mushet ceased his experiments.

At this point Frederick W. Taylor, who was at the Simonds Mfg. Co. when the first metallographic outfit was used in American industry, enters the story of steel treating. In the fall of 1880 he was foreman of the machine shops of the Midvale Steel Co., Philadelphia. William Sellers was at that time president of the Midvale company, and it is to his willingness to permit the tedious process of experimenta-

tion to take place in the shop that Taylor gives much credit for the unusual results which were to follow.

Taylor was interested in shop efficiency, a work which has been closely linked with his name ever since. To get the men in this small machine shop to increase their output was, he felt sure, merely a matter of showing them that they could earn more money by doing so. But he discovered that it was, apparently, impossible for them to produce as much as they could or would, because of the limitations of the tool steel available. He obtained permission of the president to undertake a series of experiments to investigate the laws of cutting metals with a view to obtaining information which would increase the productive output of the men in his charge. With but few slight interruptions this work continued for more than a quarter of a century, though not all of the experiments were at the Midvale plant.

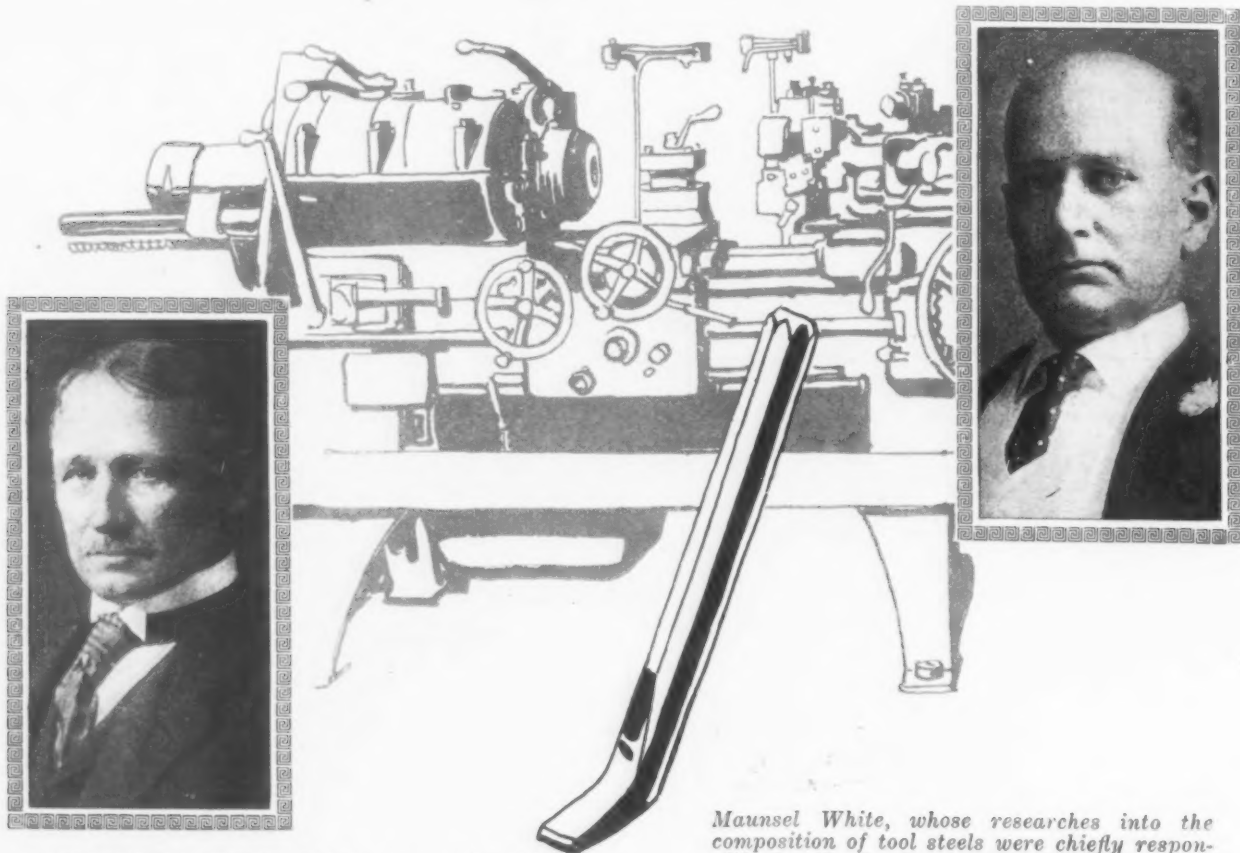
G. M. Sinclair, H. L. Gantt, Carl G. Barth and Maunsel White collaborated in this important series of experiments, the last named having been more closely connected with the work than any except Frederick Taylor himself. White was the metallurgical brains of the combination, as Taylor himself states, while Barth furnished the mathematical applications involved

for the work, might be repaid for their faith by savings in operation. But in 1906 the whole mass of data was made public by Taylor and virtually effected a revolution in machine shop practice as well as in the production of tool steels.

Between 1898 and 1900 a momentous discovery was made—that tools made from chromium tungsten steels when heated almost to the melting point would do from two to four times as much work as other tools. This discovery was made while Taylor and White were engaged in work with the Bethlehem Steel Co., and resulted in an almost complete revision of heat treatment ideas as concerned many grades of steel. Today instead of a 30-ft. per min. speed, a good high-speed steel tool may work at more than 400 ft. per min.

The Application to Industry

With comparatively cheap steel assured to industry through the Bessemer and Siemens-Martin processes, the use of steel grew apace. Sometimes there is a question as to which factor was most important—the need of the railroads for steel and its result on the productive output, or the improvements in steel quality and the growth of capacity which permitted the enormous increase in mileage.



Frederick W. Taylor, chiefly known for his doctrines of shop efficiency and for the success with which he increased human productivity by reason of eliminating waste motions, and whose discovery of high-speed steels in 1898-1900, when working in conjunction with Maunsel White, have resulted in such great savings to the industrial and mechanical world that he is entitled to an outstanding position in the field of applied research

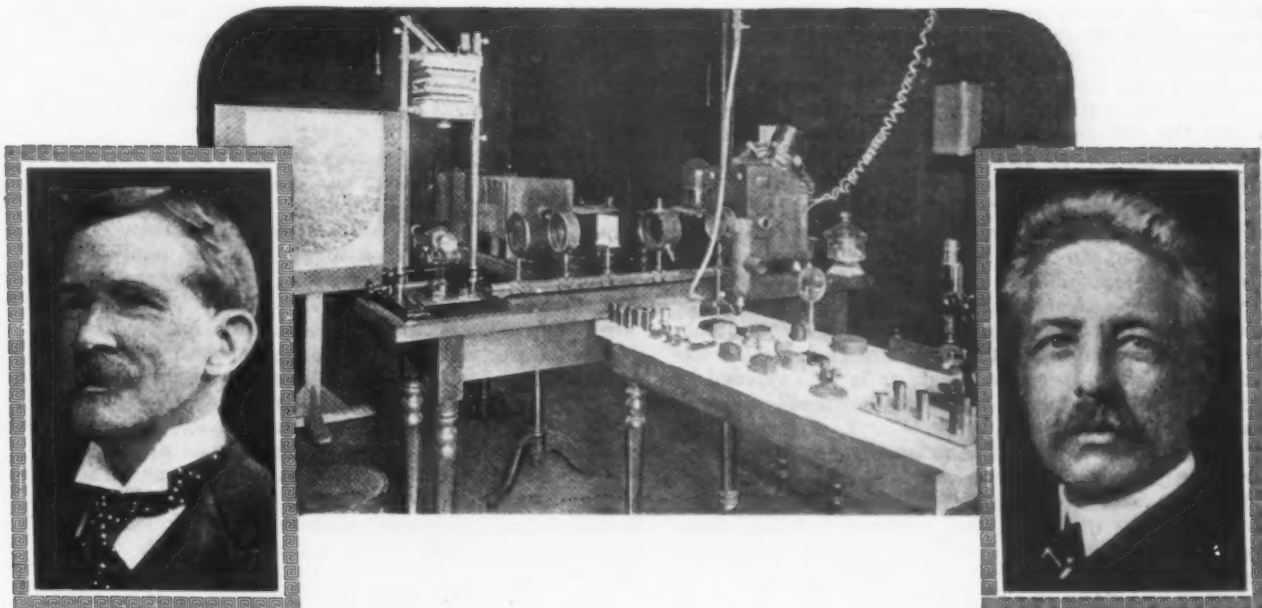
Maunsel White, whose researches into the composition of tool steels were chiefly responsible for the development of the Taylor-White high-speed steel which so startled the engineering world by operating at a speed of 150 ft. per min. at the Paris Exposition in 1900 and which has virtually revolutionized the machining of steel, stated that "nearly 200 tons of steel was cut up into turnings (for these experiments) and the investigation required a period of two years and the services of seven or eight trained experts"

and Taylor outlined the various steps in the investigation.

Until 1889 the work was carried on at Midvale; then the investigators spent some time installing their methods at various plants, the bulk of the time having been connected with the Bethlehem Steel Co., but a short period each having worked in conjunction with Cramp's shipbuilding yards, the Link-Belt Engineering Co. and William Sellers Co. During the first 26 years of this work the valuable data obtained and the process employed were kept secret in order that the companies which contributed, all told, nearly \$200,000 required

In the United States especially, the transportation industry certainly was the dominating impetus that resulted in such a rapid expansion of mill output in the last decade of the nineteenth and the first decade of the twentieth century. The effect of steel demand from the railroads in Europe was far from negligible, but since the increase in mileage was comparatively much less the force was not so evident.

There is no doubt that the first commercial applications of metallography were in connection with the testing of steel rails, both here and abroad. Dr. Charles B. Dudley, chemist of the Pennsylvania Railroad at



Henry M. Howe, to whose recognized achievements in the field of metallographic experimentation and research into the structure of steel at various temperatures must be added his contributions to the hardening theories and especially his painstaking work in coordinating the results of metallurgists in other countries with the best American practice. His mark on the steel treating science has been left in more than the nomenclature which he did so much to standardize

Albert Sauveur, who, through his experimental work when in charge of the research laboratory of the Illinois Steel Co., first employed metallographic methods in 1891 to the solution of practical steel-making problems; whose first

paper on the "Microstructure of Iron and Steel" presented to the American Institute of Mining Engineers in 1896 at once established him as a leader in the new science, and whose subsequent publication of some 120 scientific papers, his capable editorship of the "Metallographist" and its successor, the "Iron and Steel Magazine," as well as his admirable text-book "Metallography and Heat-Treatment of Iron and Steel," which is still the standard in the field, fully entitle him to the high praise given by the British Iron and Steel Institute on the occasion of the presentation of the Bessemer medal: "Professor Sauveur has done more, perhaps, than anyone in recent years to add to the information in connection with heat treating." He has been Professor of Metallurgy at Harvard University since 1905

Altoona, Pa., and Lowthian Bell, of the London & Northeastern Railway, can probably be given credit for the first commercially practical applications of metallographic practice. But the work of these first metallographists was spasmodic and they can hardly be said to have practised the science in a business sense. It is to the great steel corporations that we are led in our search for information regarding those early days.

The first metallographist to be employed exclusively for the practise of his science was, so far as records show, Albert Sauveur.

Sauveur's early contributions to the theory of iron, his searching examinations into the microstructure of steel and his leadership in the practical technique of preparing specimens, etching and photographing them made this contact with the industrial world a fortunate event for the future of the science.

His connection with the Illinois Steel Co., at South Chicago, began in 1901, terminating five years later when the arbitrary decision of John W. Gates to do away with all "unnecessary laboratory work" closed the first metallographic application to steel mill practise. The late William R. Walker was much interested in and closely connected with the developments in steel treating and testing during Sauveur's stay at Chicago. E. A. S. Clarke, now secretary of the American Iron and Steel Institute, was superintendent at this time.

Sauveur returned to Boston and there opened the Boston Testing Laboratories—perhaps the first consulting metallographist in America in a practical sense. His perfection of the apparatus used in metallographic research is well known and the first photomicrographic outfits in this country were obtained through him.

The Simonds Mfg. Co. of Fitchburg, Mass., was one of the first to recognize the value of microscopical examination of steel and purchased a metallographic apparatus in 1900. Leslie Howard of that company was responsible for the step and associated with him

in the work was Frederick W. Taylor, whose contribution to steel treating already has been recorded.

Other steel companies followed the lead of the Illinois Steel, and Unger at Carnegie, Radcliff Furness and Cox at Midvale and A. A. Stevenson of the Standard Steel Works were early interested in this work.

Tschernoff at the Oboukhoff Works in St. Petersburg, Osmond at Le Creusot and Sorby at Sheffield were, of course, engaged in metallographic work prior to this time, but rather in an experimental than in a business manner. The Terre Noir and De Dion et Bouton works in France, the Resicza plant in Austria (now in Roumania), Cockerill in Belgium and Hadfield's in England were probably the first European mills to adopt steel treating in a scientific way.

About 1905 a new influence began to make itself felt in the steel industry. The horseless carriage was



becoming an industrial factor. The automobile was slowly gaining momentum in popular favor. Production was steadily increasing and the demand for steel for automobiles was beginning to assume a tonnage aspect. More important still, the peculiar requirements of the first makers of automobiles were such as to place an unusual strain on the supplier. The frame must resist sudden and severe vibratory stresses, the rear axle must possess great torsional strength, crank shafts must be rigid and able to resist heavy impact, steering-gear specifications call for tough and resilient metal—and withal, the reduction of weight to a minimum compatible with safety is of utmost importance.

The first automobile manufacturer who took advan-

tage of the metallographic methods available at that time was the Packard Motor Car Co. Apparatus was installed and testing became part of the regular shop routine about 1908.

First the railroads, then the machine shops and finally the automobile: all these have played a part in the development of heat treating in the industrial world. "No science has contributed more to the development of American industry than metallography," writes W. H. Eisenman, secretary of the American Society for Steel Treating, to *THE IRON AGE*, "It has made it possible for motor car manufacturers to turn out stronger cars and at the same time reduce weight and cost. Through developments of steels for cutting tools, a complete revamping of the models of the machine tool industry has been brought about, as is well typified by the high grade production machines shown at this year's National Steel Exposition.

"The present-day intelligent manufacturer no longer considers his metallurgical and chemical laboratories a liability subject to elimination at the first approach of diminishing dividends, but properly regards these agents as a bulwark of defense—as his protection against undesirable materials—as his guarantee for the maintenance of the standard of his production, and as an agency for the meeting and solving of manufacturing difficulties.

"The importance of proper heat treating equipment has been recognized by progressive manufacturers in proportion as they have placed greater reliance upon the metallurgical department. The truth that a manufacturer's product is only as good as its heat treatment is increasingly recognized. In this day of advancement and enlightenment, a manufacturer who neglects his heat treatment and his men will one day awake from his long lingering slumber and be disagreeably sur-

prised to observe that he is no longer marching with the leaders, but has joined the struggling, straggling rear guard."

And with the growing recognition of the importance of steel treatment comes a constant improvement in technical apparatus.

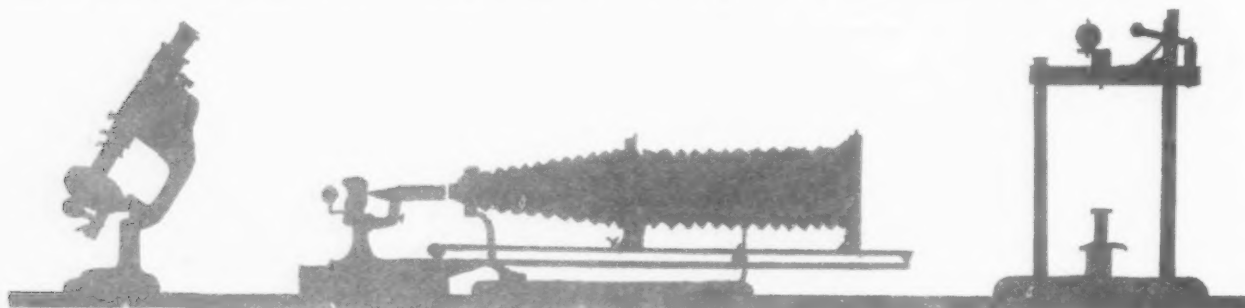
Where Sorby used a magnification of 50 diameters, the modern steel treater can employ several thousand diameters; where the etching, polishing and photographing used to take hours, it now takes minutes.

The old "harden at a bright red and temper at a straw color" methods have pretty well gone out of use, but they are still employed. The days of such methods are numbered, of course. With the multiplicity of alloy steels in use, with the increasingly exact demands of the users of steel, and with the developments in accuracy of pyrometric control and testing apparatus, it is not hard to visualize the growth in the value of steel treating that is sure to come in the next decade.

What Huxley calls "the swift acceleration of scientific research" has seldom been better exemplified than in the amazing progress made in the understanding of steel and its actions which has taken place in the last half century.

Higher magnification will bring a more intimate knowledge of that ground which lies between crystal examination with the X-ray and ordinary low power work. Macroscopic study of steels will yield valuable aid to the practical man in the rolling mill. Pyrometric control will enable the manufacturer to effect operating economies.

Can one doubt that the process of research and reasoning which led step by step from the first discovery of pearlite to the intricate study of atomic spacings will continue to bring about changes in the methods of treating the most useful metal known to man?



What Is Iron?—What Is Steel?*

New Set of Definitions Proposed—Three Kinds of Iron as Distinguished from Steel

BY DR. ALBERT SAUVEUR

TO designate as steel a commercial product the composition of which approximates very closely to that of the element iron is so manifestly inconsistent that it brings up again the much-debated question of the nomenclature of iron and steel; and it shows up the confusion which still exists in spite of the work of numerous committees.

Some authors would classify the commercially pure iron to which I refer, and which is known as Armco ingot iron, with the steels because it is produced in a molten state. The manufacturers of this metal have chosen the designation of ingot iron; and it seems to me that if ever a metallurgical product could rightfully be called by that name it certainly is this carbon- and manganese-free metal produced in an open-hearth furnace. Yet, the term ingot iron, which is the equivalent of the German "flusseisen," has been proposed by Wedding to designate Bessemer steel, and in Germany it is applied to the metal produced in the converter when it has not too high a carbon content.

Instead of refusing the designation of ingot iron to Armco metal, common sense should make us exclude from this class all low carbon steels and include in it only Armco ingot iron and similar products. For is it not the only real ingot iron which has ever been manufactured on a commercial scale?

Two methods of distinguishing between iron and steel have been put forth. The term steel has been made to cover all ferrous products which can be hardened by quenching, while the term iron was applied to those that cannot be thus hardened, regardless of the method of manufacture. Then again, all malleable products obtained in a molten state were called steel, and those obtained in a pasty condition were called iron, irrespective of their chemical composition and of their physical properties. The first classification has prevailed to a certain extent in Germany, though even there mild steels, as already stated, are known as "flusseisen." The second classification has been adopted quite generally in the United States, England and France, not because it was considered entirely satis-

*Translated from *La Revue de Metallurgie*, June, 1925, by A. Papineau Couture.

(Concluded on page 652)

Steel Treaters' Week at Cleveland

Seventh Annual Convention and Exposition of the
American Society for Steel Treating,
Sept. 14 to 18

ALL previous records promise to be eclipsed at the seventh annual convention of the youngest American technical society—the American Society for Steel Treating—in Cleveland, Sept. 14 to 18. A comprehensive technical program of about 35 papers published in *THE IRON AGE*, Aug. 13, has been arranged for the sessions to be held each day—in the morning at the Hotel Cleveland, the headquarters, and in the afternoon at the Hollenden Hotel.

Despite the fact that 45,000 sq. ft. of space is to be taken up by the exposition in the Public Auditorium,

Cleveland's celebrated convention hall, 10,000 sq. ft. more was applied for. Six years ago in Chicago, at the first convention, only 6500 sq. ft. was used. The number of exhibitors is placed at 200.

The Society of Automotive Engineers is to hold its regular production meeting at the Hotel Winton during the same week. The technical program was published in *THE IRON AGE*, Aug. 27.

A complete account of the technical papers and the exposition will be published in the columns of *THE IRON AGE*, Sept. 24.

Exhibitors and What They Will Display at the National Steel Exposition

A

ABRASIVE MACHINE TOOL CO., East Providence, R. I. Booth 246. No. 3 horizontal spindle surface grinding machine and No. 33 verticle spindle surface grinding machine, both motor driven and equipped with magnetic chucks. Represented by: Kenneth B. MacLeod, N. D. MacLeod and Walter Sceeles.

ACME MACHINE TOOL CO., Cincinnati. Booth 250. Full universal turret lathe, motor driven. Represented by: A. T. Stehn and F. E. Winkelman, sales engineers; Charles Meier, treasurer and general manager.

AIR REDUCTION SALES CO., New York. Booths 271 and 281. Airco oxygen, Airco acetylene and Airco calorene in cylinders; Airco-Davis-Bournonville welding and cutting torches, regulators and supplies; Airco-Davis-Bournonville oxygen discharge manifold; radiograph for oxy-acetylene machine cutting; oxygraph for oxyacetylene machine cutting. In operation. Represented by: G. F. Weiser, industrial engineering department; W. F. Cooper, J. H. Gjerdum, C. E. Hobbs.

AJAX MFG. CO., Cleveland. Booth 3. Ajax upsetting forging machine; ajax board drop hammer and sample upset forgings. Represented by: J. R. Blakeslee, president; H. D. Heman, general manager; A. L. Guilford, Western manager; Gordon Fristoe, sales engineer, and W. W. Criley.

CHARLES G. ALLEN CO., Barre, Mass. Booth 213. A four spindle Allen ball bearing power feed drilling machine; four spindle Allen ball bearing drilling machine showing different types of heads, in operation. Represented by: Harding Allen and Charles G. Allen.

AMERICAN GAS FURNACE CO., Elizabeth, N. J. Booths 220, 221, 222. Gas carbonizing machine; salt bath furnaces for preheating high-speed steel and drawing for carbon and high-speed steel; high-speed steel oven furnace, operating on high pressure gas supplied by company's rotary gas booster; automatic temperature controller; high pressure blower, new type; burners and blowpipes. Represented by: W. H. Kelsey, Cleveland representative; J. Mehrman, chief demonstrator; Gustave Schwab, mechanical engineer; Theodore Farwick, Sr., automatic temperature controller and burner representative; P. C. Osterman, vice-president.

AMERICAN RESISTER CO., Philadelphia. Booth 116A. Globar non-metallic electric heating elements in actual operation at temperatures ranging from 1600 to 3000 deg. Fahr.; high-speed steel heat treating and forging furnaces equipped with Globar non-metallic heating elements, operating at temperatures up to 2400 deg. Fahr.; laboratory and assay furnaces equipped with Globar non-metallic heating elements, operating at temperatures up to 2400 deg. Fahr. Represented by: Joseph A. Steinmetz, president; Walter W. Perkins, vice-president and treasurer; W. E. Duersten, vice-president in charge of operations; B. G. Tarkington, sales engineer; Oscar Brophy, sales engineer; H. N. Shaw, sales engineer, and K. E. Rogers, sales promotion.

AMERICAN TOOL WORKS CO., Cincinnati. Booths 224, 225. Motor driven lathe 14-in. x 6-ft.; 24-in. motor driven

shaper; 24-in. x 12-ft. heavy pattern motor driven lathe; 5-ft. triple purpose plain radial drill, motor driven; 3-ft. Maxi-speed sensitive radial drill, motor driven; 3-ft. gear box belt driven radial drill. Represented by J. C. Hussey, Western sales manager.

AMERICAN STAINLESS STEEL CO., Pittsburgh. Booth 81. Articles made from stainless steel and iron. Represented by: John C. Neale, president; Charles S. Bunting, secretary-treasurer.

B. C. AMES CO., Waltham, Mass. Booth 210. Triplex combination lathe, milling machine and drill press; Ames bench milling machine; Ames bench lathe, cabinet type; Ames micrometer dial gages. Represented by Warren Ames, president.

ANCHOR DRAWN STEEL CO., Latrobe, Pa. Booth 84. Gold Anchor high speed drill rods; Blue Anchor carbon drill rods; Red Anchor carbon drill rods; cold drawn threading chaser steel in high speed, carbon and alloy grades; cold drawn tap steel in high speed, 1½ per cent tungsten and alloy grades; cold drawn stainless steel and iron; cold drawn special shapes in high speed, tool steels, alloy steels, carbon steels and screw stock; cold drawn key stock and cold drawn specialties. Represented by: D. R. Wilson, president; G. W. Morrison, vice-president in charge of operations; W. W. Noble, vice-president in charge of sales; Felix Kremp, metallurgist.

ARMSTRONG-BLUM MFG. CO., Chicago. Booth 45. Marvel metal band saw machine; Marvel automatic high-speed hack saw; Marvel general work hack saw; Marvel punching, shearing and bending machine. Represented by Harry J. Blum, secretary.

ARMSTRONG CORK & INSULATION CO., Pittsburgh. Booth 57. Nonpareil insulating brick for furnaces and ovens; high pressure covering, blocks and cement for high temperature insulation; cork covering for refrigerated lines and tanks; corkboard for cold storage rooms; Linotile and cork tile floors. Represented by: J. T. Gower, Cleveland manager; P. W. Adams, N. P. Waite, James A. Willson.

ATLAS ALLOY STEEL CORPORATION, Dunkirk, N. Y. Booth 118. High speed, carbon and alloy tool steels in various forms. Represented by: A. F. Dohn, president; F. B. Lounsbury, vice-president and metallurgist; C. P. Burgess, assistant to president; Walter Bould, assistant treasurer; W. H. Willis, assistant metallurgist; D. G. Hoyt, assistant metallurgist; W. H. White, Cleveland district sales manager; J. S. Marlowe and J. E. Jones, salesmen.

E. C. ATKINS & CO., Indianapolis. Booth 100. Silver steel power hacksaw blades; No. 3 metal cutting band saw machine; No. 18 and No. 7 Kwik-kut machines; Cantol belt wax; Atkins hacksaw frames. Represented by: Edward S. Norvell, manager metal cutting department; H. L. Pruner, district metal saw specialist; A. Mertz, Cleveland representative; W. R. Chapin, metallurgist; William Appel, chemist.

AVET DRILLING MACHINE CO., Cincinnati. Booth 253. In

(Continued on page 659)

Mechanical and Magnetic Hardness

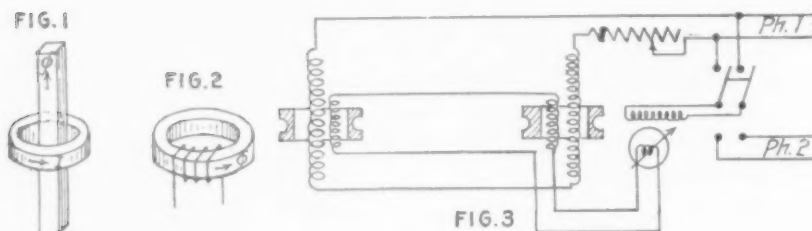
Studies in Practical Magnetic Inspection of Ball Bearing Races Heat Treated in Quantity —Correlation of Hardness

BY K. HEINDLHOFFER*

THE author discusses the results of alternating current magnetic readings taken on a large number of hardened ball bearing rings. Most of the rings were heat treated in quantity production according to standard shop practice. The magnetic readings were correlated with the mechanical hardness of the rings. In the average case a simple correlation exists between mechanical and magnetic hardness within the hardness range investigated.

DURING the last few years there has been a growing interest in the possible application of magnetic inspection of manufactured articles, especially those made of heat-treated steel. In an interesting paper ("A New Method of Magnetic Inspection," annual meeting American Society for Testing Materials, June, 1923) A. V. DeForest described

of the ring. A greater resistance of the ring means weaker current, which in turn counteracts the flux set up by the magnetizing current. A small coil of a few hundred turns of fine insulated wire, called the "search coil," is placed between the ring and the core. The induced electromotive force, corresponding to the resultant flux passing through the search coil is an



Figs. 1 and 2—Two Possible Methods of Applying the Alternating Current for Obtaining Magnetic Readings. Fig. 3—Diagram of the Wiring Used in the Magnetic Tests.

a simple method, proposing alternating current for rapid inspection of tools and similar products.

Ball-Bearing Rings

An attempt is made in this article to describe the results obtained on inspection of a large number of hardened ball bearing rings, employing the alternating current method in a simplified form.

The object was to correlate the magnetic reading with those obtained by mechanical hardness testing devices such as the Rockwell hardness tester and the scleroscope. Since the hardness of the rings was permitted to vary only within a narrow range, the requirements on the magnetic discriminations were similar to those on dial gage inspection of geometrical dimensions. In other words the hardness of the rings should not deviate more than a given small amount from a ring which was considered to possess the correct hardness.

Rapid Inspection with Circular Current

Of the two possible methods shown in Fig. 1 and Fig. 2, Fig. 1 was found to give better results, which is rather fortunate as this method of circular current in the ring lends itself better to rapid inspection. The laminated open core is wound by a layer of about 200 turns of insulated wire and is magnetized by a constant 60 cycle alternating current of the order of one ampere. The alternating flux set up in the core induces an alternating current in the ring. The intensity of this current mainly depends on the resistance of the ring and also on its magnetic qualities. For instance great permeability will cause a so-called skin effect, which increases the apparent resistance

indication of the current induced in the ball bearing ring.

In order to be able to measure small "magnetic" differences between rings, it is convenient to counteract the electromotive forces in the first search coil by an electromotive force induced in another coil interposed between a "standard" ring and a second core which is identical with the first one. The difference of electromotive forces is measured by a two element a. c. galvanometer of the Leeds and Northrup design. The field of this galvanometer may be

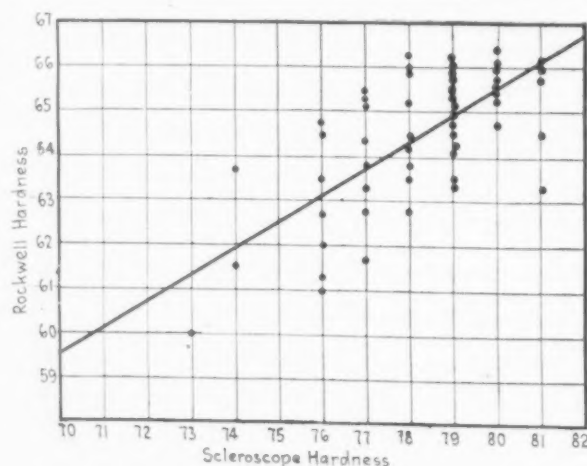


Fig. 4—Correlation Between Rockwell and Scleroscope Hardness. Each Rockwell is the mean of 6 readings and each scleroscope is the mean of 3 readings

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Fig. 5—Correlation Between a Single Rockwell and a Magnetic Reading. Magnetic method: Circular current in the ring, constant magnetizing current, balanced search coils, only one phase used

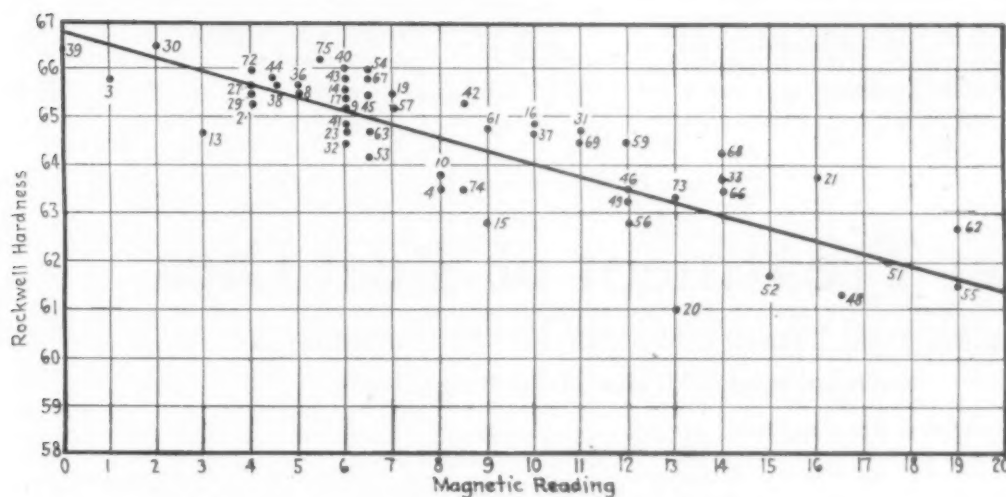
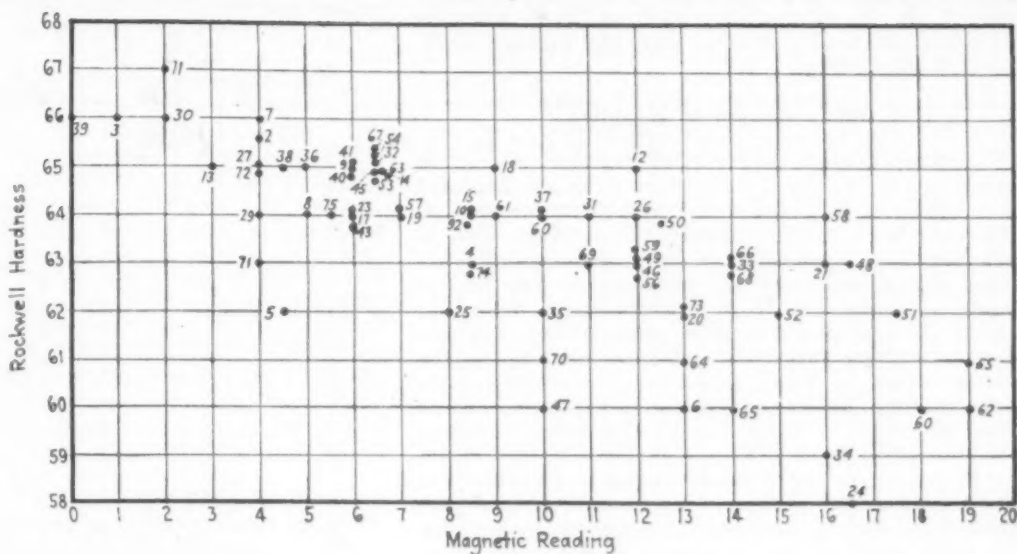


Fig. 6—Correlation Between the Average of 6 Rockwell Readings and the Magnetic Reading

energized by the same supply as the cores. It is possible to apply two quadrature phases in succession as proposed by A. V. DeForest. The wiring diagram is shown in Fig. 3. It was found that for the underlying purpose, where small differences were to be discriminated, one phase was sufficient which was of considerable advantage in point of view of rapid inspection.

Multiplying the Cases

Measurements of the kind described in this paper are of little value if repeated on only a few specimens. In order to obtain a true picture of the correlation between magnetic and mechanical hardness, a great number of rings was inspected by both mechanical and magnetic methods.

In order to compare the reliability of the magnetic with the scleroscope inspection, the correlation between Rockwell and scleroscope hardness numbers was first established (Fig. 4). The amount of dispersion of the readings expressed in Rockwell hardness units is about ± 2 . The apparent dispersion of the magnetic readings is greater, provided one Rockwell reading is taken per ring (Fig. 5). This is due to two causes. First the Rockwell readings may be inaccurate to a small extent and second the hardness of the ring is not perfectly uniform. The correlation is much improved by taking six Rockwell readings per ring and plot their mean. Fig. 6 shows this correlation. The dispersion is considerably less than in the preceding case and is even better than with the scleroscope, which would prove that the magnetic reading gives a good average hardness of the ring.

Another example which illustrates the agreement between magnetic and mechanical hardness is given in Fig. 7. Four different heat treatments on each 50

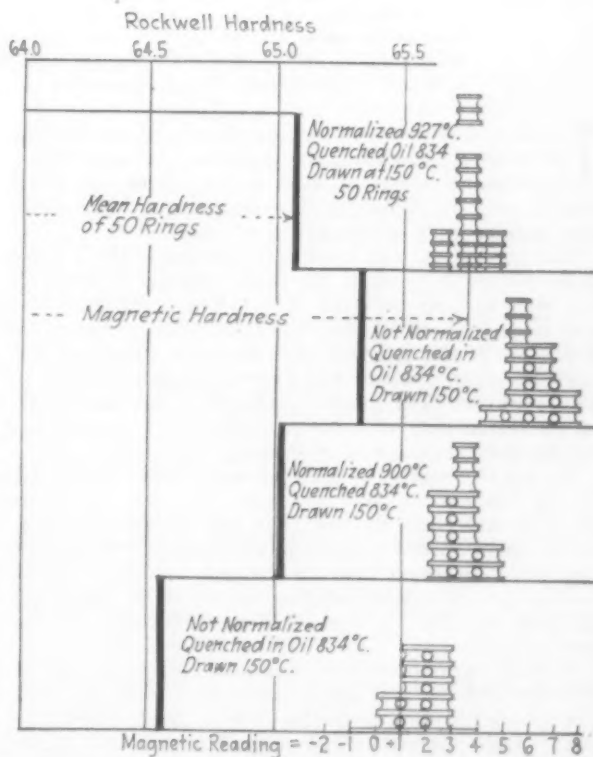


Fig. 7—Correlation Between the Mean Hardness of 5 Rings Quenched and Normalized at Different Temperatures and the Magnetic Readings

rings are compared for hardness (Fig. 7). The rings are shown in groups according to their magnetic hardness which is compared with the average hardness of each group.

Rings Abused in Mounting

Another example which is of practical interest is given in Fig. 8. The rings whose magnetic hardness is compiled in this diagram, having been returned to the manufacturer, were abused in mounting. Due to hammering in assembling, a great number of inner rings showed ball dents and consequently they became noisy in operation. It is interesting to note that among those rings which were comparatively soft, the dented bearings were more numerous than among the harder rings. A strict proportionality between magnetic readings and the corresponding number of dented bearings could of course not be expected, the degree of hammering being different on the different rings.

Before concluding it is interesting to mention, that the variation of chemical composition and of the geometrical dimension within the permissible tolerances has little effect on the underlying magnetic readings. The speed of magnetic inspection was found to be about 5 seconds per ring and was limited by the period of the galvanometer. It should not be difficult to reduce this time to half, provided the period of the instrument was reduced, which should be possible by reducing its excessive sensitivity.

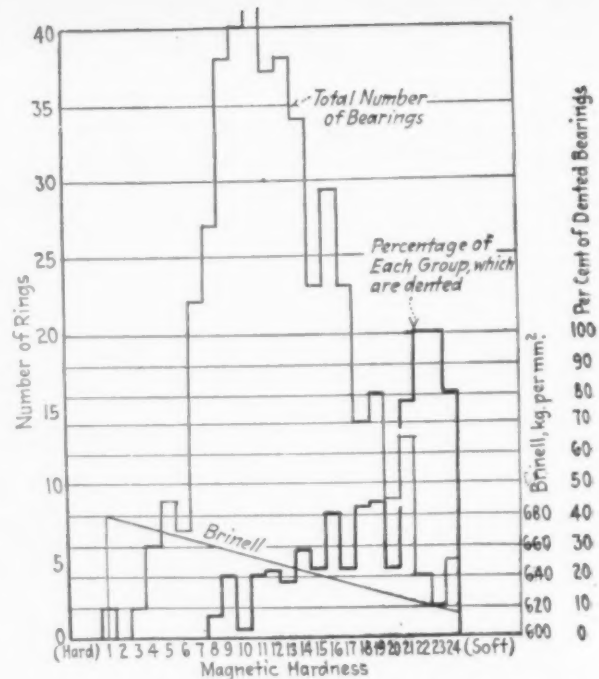


Fig. 8—Magnetic Hardness of Rings Returned to the Manufacturer

Heat Treatment of Steel Dies

Practical Heat Treater's Methods for Oil-Hardening Non-Shrinkable and Water-Hardening Steels

BY C. S. SMITH

THE author of this article is general foreman in a plant where steel treating is done on a fairly large scale. His recommendations are based on a number of experiments designed to determine time and temperatures. He then applied his conclusions to actual dies of various sizes. He claims that he is able to take "any make of oil-hardening steel and treat it so that the results after hardening will be within plus or minus 0.002 in." The contribution has added interest in that it is based on purely practical experience.

THIS article covers the oil-hardening of non-shrinkable steels and the more popular grades of water-hardening steels in such a way that any heat-treater can, by following the instructions, get extra good results with either grade of steel.

Taking the various operations through which a die passes before it comes to the heat-treating department, it is well to bear in mind that, when a piece of tool steel is to be heat treated, the heat-treating operation should be in the mind of the foreman when he first turns his steel over to his forging department or to the die-maker. The results obtained in the heat-treating operation may also be influenced to a certain extent by the forging and machining operations.

To put the matter in another way: When the artist sets up his canvas and lays out his paint, it is not just the materials he sees but the finished picture. The foreman should have in mind the heat treating of a die when he starts that die through his shop. However, as this is a heat-treating article, it is concerned just now with the business of die building and not the machine shop end.

It is excellent practice to pre-heat to approximately 1200 deg. and let cool any piece of tool steel that has gone through a very severe forging or machining operation. Such operations cause strains that will make themselves felt in the final results obtained in the furnace room.

Fig. 1 shows a cross section of a peculiarly shaped die part and reveals some of the difficulties to be met. It has been the writer's experience that, no matter how

well a piece of steel has been annealed, after forging it will have machining strains that should be removed by the pre-heating process. Failure to do this will often result in a cracked die. After the steel has cooled down to about 350 deg. from the pre-heating temperature, it can be placed in the furnace for the quenching temperature.

The practice which will give the best results with either oil-hardening or water-hardening steels is to have the furnace heated to approximately 500 deg. Fahr. and raise the temperature of the die steel to that same point either in a slow furnace or on a hot plate. Because this is good practice the charts accompanying this article are all started at that temperature.

In non-shrinkable steel the critical range is reached between 1375 and 1425 deg. Fahr. and in water-hardening steel it is reached at around 1350 deg. Fahr. Now that the furnace is at 500 deg. Fahr. and the steel has been brought up to that temperature, the steel can be placed in the furnace and the current turned on or the gas and air adjusted to give a slow, steady rise in temperature. Reference to either of the charts will show that the rise in temperature should be steady with no fluctuations whatever. It is impossible to get an even temperature otherwise and, in heat treating, an irregular temperature means a die of varying hardness. The reason the steel and furnace should be at the same point when the two are brought together is that the heat treater should at all times keep from subjecting his dies to sudden changes of temperature.

This rule of course holds good only during the heating of a die and during the drawing after quenching.

Too often the heat treater disregards the advice about holding to a steady drawing temperature. It must be remembered that it is as easy to ruin a die during the drawing operation as it is during the heating up process; perhaps easier. It should also be remembered that the shrinkage of a die can be controlled to a certain point by the way it is quenched. For instance: A number of large dies of regular shape but having a large number of holes of various sizes were to be hardened and they were dipped in the manner which seemed the most reasonable. In fact the steel maker's representative advised that particular way of dipping. In spite of the unusual amount of shrinkage this method was adhered to for a long time till rather suddenly it became manifest that this was not the right way to do it. A change was made in the method of dipping and the shrinkage was reduced about 50 per cent.

The change was simply to dip edgewise when all reasoning and past experience was to the contrary. It is true that there must be a precedent for everything and that the art of heat treating offers a wide and vastly interesting field for experimentation. Its possibilities are almost limitless.

Another point is that during the warming up process prior to placing in the furnace for the final heating,



Fig. 1—Cross Section of a Steel Die of Intricate Design

the steel must be warmed up slowly. Two experiments were tried with non-shrinkable steel to determine what effect, if any, the warming up process had on the final results obtained. In the first experiment the die was placed in the furnace at the time the furnace was first lighted and allowed to warm up with it. During the grinding operation a large crack developed which opened up about 6 in. long. I thought at the time it might have been caused by too high a temperature during the warming up process. This I knew would cause a too rapid expansion, which meant distortion. In the second experiment the die was warmed up to about 500 deg. Fahr. Five hours were allowed for this. All other operations having been handled the same as in the first experiment, the excellent results obtained were attributed to the slower warming up of the die. Of course, one wants to eliminate distortion as much as possible in water-hardening steel but the rate of cooling is far too rapid to permit of any success in this direction except to a limited extent. Besides one always allows for a certain amount of distortion in the latter steel.

It is essential that when the steel reaches the critical range the temperature be very carefully watched and when the pyrometer shows a tendency to stand still or fall slightly when it reaches a point between 1350 and 1400 deg. let it alone for at this point the steel is passing through a period of transformation; it is changing from a block of high grade steel to something really useful. After a little the pyrometer will rise again slightly and this means the steel can be quenched or safely run up a little higher and then quenched.

If quenched while at the critical range a die will result which will show enough hardness with considerable ductility. This is a much desired condition. If allowed to go higher the hardness will increase but the ductility will decrease and brittleness will take its place. For all general purposes such as are required in blanking and piercing dies, excellent results will be obtained by quenching at the critical range but, for dies where a greater hardness is desired, the temperature should be allowed to run up beyond that point.

The greater hardness obtained at the higher temperatures is secured at the sacrifice of grain refinement for as the temperature goes up the grains begin again to expand.

In heating a die for quenching, the heat treater has the pyrometer and magnet to guide him and, even if he does miss the proper temperature by a few de-

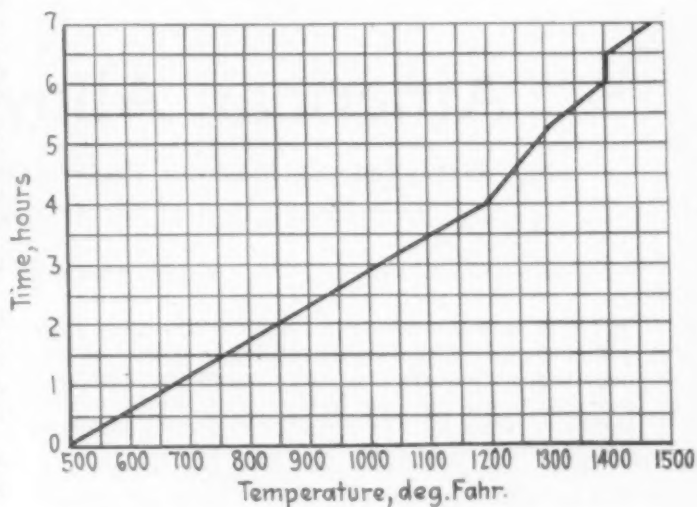


Fig. 2—Temperature Chart for Oil Hardening Steel

grees, he can, if he is careful, save his die in the drawing operation. My experiments showed that here is where the steel treater's ability actually counts. On the other hand even if the steel has been carefully handled through all previous operations it can be very easily spoiled in the drawing operation. It is very necessary that the drawing medium, whether of salts or oil or the old fashioned hot-plate, be very carefully prepared. It is not enough merely to heat this medium up to about the right point and then place the die in it for a while. The steel treater must determine beforehand at just what temperature he is going to remove the die from the quenching bath and have the drawing medium at this same temperature. Now the temperature at which the drawing is to be done must

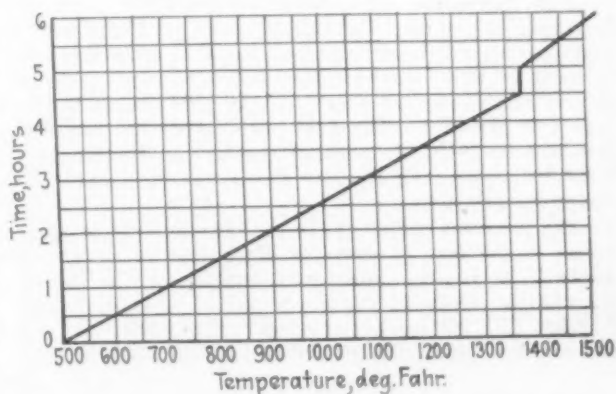


Fig. 3—Temperature Chart for Water Hardening Steel

be determined by a knowledge of what the die is going to have to do.

Many steel treaters develop the habit of cooling down their work as soon as the drawing has been completed but the experiments carried on by the writer show that better results are obtained by permitting the steel to cool down with the drawing medium or withdrawn and covered over so that it can cool very slowly.

It will be noticed that in the chart, Fig. 2, the temperature starts at 500 deg. and climbs slowly till it reaches 1200 deg. in four hours' time. The reason for this is that the best results are obtained by heating the steel up very slowly from nothing to 500 deg. and then placing it in the furnace when the furnace reaches that point. In the next two hours it climbs to 1425

deg. It has now reached the critical point and the pyrometer shows no advance in temperature for about 20 min. In fact the temperature falls slightly. It does not make much difference if the temperature is now whipped up to about 1460 deg., for that is the best point for quenching the average oil-hardening steel.

The chart in Fig. 3 is to be interpreted in the same

way as the other except that in this chart the pyrometer climbs to 1375 deg. in 4½ hr. As this is the approximate critical point it will, as in the other chart, remain stationary for a few minutes, then it can be raised to 1525 deg. which is a very good temperature for very large dies. For smaller dies the critical point is safe enough.

American Alloy Steel Industry

New Records Made in 1924—Statistics for 16 Years Analyzed—

Production of Electric Alloy Castings Expands

BY EDWIN F. CONE

NEW records were again made in the alloy steel industry of the United States in 1924. In two important particulars last year's record was outstanding—more alloy steel made than ever before in proportion to the total steel output and a marked expansion in output of electric alloy steel castings.

The American alloy steel industry, as such, dates back to 1909. A little more than 16 years ago almost no alloy steels were made on a commercial scale excepting, of course, high-speed steels, which did not run into large quantities. Today alloy steels of various types are indispensable in many industries. Their use and variety has expanded to such an extent that Sir Robert Hadfield, the eminent British metallurgist, recently designated the alloy steel industry as "a new age in metallurgy."

A review of the progress of the American alloy steel industry in general and particularly last year is presented in this article. It is based on an analysis of the data of the American Iron and Steel Institute, supplementing two similar articles in THE IRON AGE, Sept. 28, 1922, and Sept. 11, 1924. The review also covers developments in alloy steel castings, electric alloy steels and electric alloy steel castings.

Expansion in the Entire Industry

Expansion in production has been the feature of 1924 developments. Despite quite remarkable increases in output in the two years previous to 1924, the record last year excelled any previous one. In 1924 the percentage of alloy steel of the total ingot and castings output of the country was 5.35. In 1922 and 1923 this was 4.70 per cent. The best previous record was 4.27 per cent in 1919. In each of the last two years over 2,000,000 gross tons of alloy steels has been made by American furnaces.

The progress registered in the development of alloy steels in the last 16 years or since 1909 is shown by Table I. It is also represented graphically in one of the charts. Only 16 years ago the alloy steel output was but 0.75 per cent of the total steel made. By the end of 1924 this had expanded to 5.35 per cent, or over

7 fold. In quantity the expansion in the same 16 years has been 1,844,429 tons or over 10 times.

A more interesting portrayal of the breadth of this expansion is afforded by the last column of Table I. In 1909 the output of total steel to alloy steel was over 130 to 1; that is, there were about 130 tons of steel ingots and castings made for every ton of alloy steel. In 1924 this proportion had fallen to 18.7 tons for every ton of alloy steel. Ten years ago, or in 1914, there were 36.3 tons of total steel made to one ton of alloy steel—an increase of nearly 100 per cent in the decade.

Alloy Steel Castings—Slight Increase

There has been very little change in the relative production of alloy steel castings in the last five years. The record is given in Table II, which, based on the same statistics, gives the total alloy steel and the total alloy steel castings made in the last 16 years. The total alloy steel castings made last year—85,948 tons—is 4.24 per cent of the total alloy steel output. This compares with 4.37 per cent in 1923 and with 4.97 per cent in 1921, an exceptional year. The 1924 percentage is also about the same as the average for the four previous years, 1920 to 1923 inclusive.

A singular feature of this phase of the alloy steel industry is that in the four years previous to the war, the proportion of alloy steel castings was the largest on record—nearly 12 per cent of the total for the four years or almost three times the ratios in the last five years. This may be partially explained by the smaller relative demand for alloy steel ingots in the pre-war years.

Electric Alloy Steels

Some interesting features are presented by a study of the electric furnace phase of the American alloy steel industry. The official record for the last 16 years of electric alloy steels as a whole compared with the total alloy steel made is arranged in Table III.

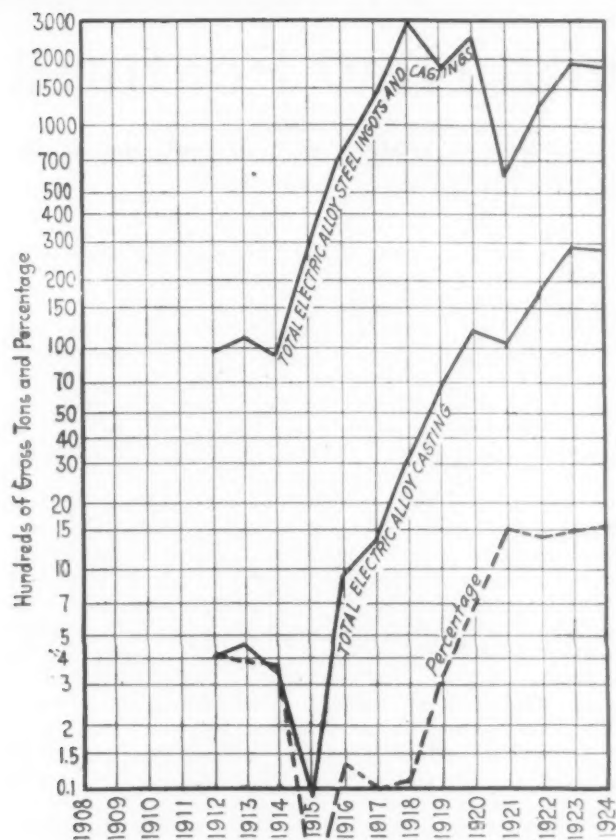
The decided expansion which took place in 1923 was maintained; in fact, slightly increased in 1924. Last

Table I—Production of Steel Ingots and Castings and of Alloy Steel Ingots and Castings in the United States

	Total Steel, Gross Tons	Alloy Steel, Gross Tons	Alloy Steel of the Total, Per Cent	Tons of Total Steel to 1 Ton Alloy Steel
1909.....	23,955,021	181,980	0.75	131.6
1910.....	26,094,919	567,819	2.17	45.9
1911.....	23,676,106	481,459	2.03	49.1
1912.....	31,251,303	792,501	2.53	39.4
1913.....	31,300,874	714,357	2.28	43.8
1914.....	23,513,030	646,953	2.75	36.3
1915.....	32,151,036	1,021,147	3.17	31.4
1916.....	42,773,680	1,362,615	3.18	31.3
1917.....	45,060,607	1,644,335	3.65	27.4
1918.....	44,462,432	1,787,852	4.02	24.8
1919.....	34,671,232	1,481,188	4.27	23.4
1920.....	42,132,934	1,660,292	3.94	25.3
1921.....	19,783,797	809,548	4.10	24.3
1922.....	35,602,926	1,673,496	4.70	21.3
1923.....	44,943,696	2,106,489	4.70	21.3
1924.....	37,931,939	2,026,409	5.35	18.7

Table II—Production of Total Alloy Steel and of Alloy Steel Castings in the United States

	Total Alloy Steel, Gross Tons	Total Alloy Castings, Gross Tons	Percentage of Castings of Total
1909.....	181,980	23,002	12.64
1910.....	567,819	29,357	5.17
1911.....	481,459	56,290	11.69
1912.....	792,501	103,109	13.01
1913.....	714,357	88,927	12.44
1914.....	646,953	69,846	10.79
1915.....	1,021,147	97,896	9.58
1916.....	1,362,615	56,458	4.14
1917.....	1,644,335	67,529	4.10
1918.....	1,787,852	66,485	3.71
1919.....	1,481,188	45,372	3.06
1920.....	1,660,292	68,353	4.11
1921.....	809,548	40,255	4.97
1922.....	1,673,496	59,104	3.53
1923.....	2,106,489	92,220	4.37
1924.....	2,026,409	85,948	4.24



How the Proportion of Alloy Steel to the Total Steel Produced Has Been Gradually Increasing. This ratio chart makes the rates of fluctuation truly comparable

year the proportion of electric alloy steel of the total alloy steel made was 9.30 per cent as against 9.25 per cent in 1923. Ten years previous it was only 1.44 per cent.

The country's electric steel industry did not attain commercial prominence until 1912. Since then the expansion has been notable. The table brings out the fact that the expansion in this industry was larger in the years immediately following the war than during the war period, except possibly 1918. A satisfactory explanation of this is difficult, nor is it easy to understand why so large a percentage as 7.81 per cent should have been made in 1921, the most abnormal year in over a decade.

Electric Alloy Steel Castings

The most remarkable development in the alloy steel industry has been the rapid expansion in the output of alloy steel castings from electric furnaces. This started four years ago and has continued ever since. Last year the output of this grade was 28,821 tons

Table III—Production of Total Alloy Steel and of Alloy Steel in Electric Furnaces in the United States

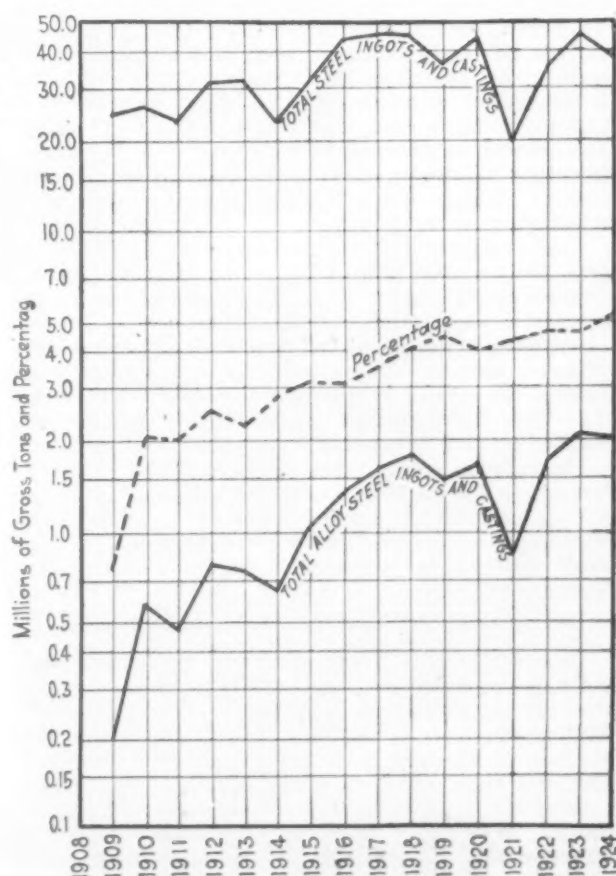
	Total Alloy Steel, Gross Tons	Electric Alloy Steel, Gross Tons	Electric Alloy Steel of Total Alloy Steel, Per Cent
1909.....	181,980	.....	.....
1910.....	567,819	608	0.11
1911.....	481,459	.....	.....
1912.....	792,501	9,619	1.21
1913.....	714,357	11,264	1.57
1914.....	646,953	9,344	1.44
1915.....	1,021,147	27,944	2.73
1916.....	1,362,615	71,129	5.22
1917.....	1,644,335	130,578	7.94
1918.....	1,787,852	290,961	16.26
1919.....	1,481,188	181,632	12.26
1920.....	1,660,292	245,572	14.78
1921.....	809,548	63,246	7.81
1922.....	1,673,496	125,419	7.49
1923.....	2,106,489	194,976	9.25
1924.....	2,026,409	188,563	9.30

Table IV—Production of Total Alloy Steel and of Alloy Steel Castings from Electric Furnaces in the United States

	Total Electric Alloy Steel, Gross Tons	Electric Alloy Castings, Gross Tons	Electric Alloy Castings of Total Alloy Steel, Per Cent
1909.....	.....	.....	.....
1910.....	608	8	1.32
1911.....	.....	.....	.....
1912.....	9,619	402	4.18
1913.....	11,264	443	3.93
1914.....	9,344	340	3.64
1915.....	27,944	96	0.24
1916.....	71,129	926	1.30
1917.....	130,578	1,296	0.99
1918.....	290,961	3,076	1.05
1919.....	181,632	6,057	3.33
1920.....	245,572	11,710	4.77
1921.....	63,246	10,084	15.94
1922.....	125,419	17,760	14.20
1923.....	194,976	29,054	14.90
1924.....	188,563	28,821	15.33

or 15.33 per cent of the total electric alloy steel. While not quite equal to the exceptional year, 1921, when the output was 15.94 per cent, the quantity produced last year was nearly three times as much. In fact, the combined output for 1923 and 1924 of over 57,000 tons is nearly equal to that of all the years previous to 1923. This expansion is further convincing evidence of the constantly greater use of heat-treated electric alloy castings in place of regular forgings. The greater use of the electric furnace for making manganese steel castings is also a factor.

Two modern developments have made possible the remarkable expansion of the alloy steel industry: The electric furnace and heat treatment. The former has encouraged the making of ferroalloys without which alloy steels cannot be made. New alloy steels are a result also. Heat treatment, because of the rapid development of processes and equipment, is each year bringing both old and new alloy steels to high usefulness.



Castings of Electric Alloy Steel Have Rapidly Been Increasing in Tonnage and in the Percentage of All Alloy Steel Made in Electric Furnaces

Milling Machines with New Features

Pyramid Form of Column Claimed to Add Rigidity and Tapered Roller Bearings in Spindle Drive to Increase Cutting Power

"PYRAMID" form column, and the use of tapered roller bearings in the spindle drive, are outstanding features of the milling machines here illustrated, which are being placed on the market by the Cincinnati Milling Machine Co., Cincinnati. The new machines are available in plain and universal styles and in the following types and sizes: Nos. 2 and 3 high power; No. 3 standard; Nos. 1 and 2 M. In vertical machines the sizes are Nos. 1 and 2 M and No. 3 high power.

The pyramid form column is intended to provide maximum strength and rigidity, giving an adequate foundation for heavy cutting. It tapers gradually in a straight line from the overarm to the rim of the base as shown and gives the machine a pleasing appearance. It also serves to inclose the main drive motor when self-contained motor drive is desired.

The column cover plates at the rear are interchangeable for overhead belt or inclosed motor drive, and the change can be made at any time. The motor is bolted to a flat plate machined on both sides, which in turn is bolted to the box section base of the machine, an arrangement claimed to eliminate vibration. The drive from the motor to the main driveshaft of the machine is by silent chain. Ample ventilation is provided through vents in the sides of the column and the rear cover of the motor compartment. Provision is made for convenient oiling of the motor and adjusting the brushes through the vent holes. The motor may be removed and replaced easily.

Sliding Gear Transmission

Sliding gear transmission with its shafts mounted in tapered roller bearings is employed for the spindle drive. Swinging brackets and tumblers are eliminated. Alloy steel gears, heat treated, are used throughout and all shafts are supported in the main frame at both ends in the tapered roller bearings, which construction is stressed as assuring that the highest percentage of power put in at the pulley is utilized at the cutter. The tapered roller bearings are stated to be long-lived, to reduce maintenance and contribute to smooth cutting action. Multiple splines, integral with the shafts, have replaced loose-fitted keys.

The company's rectangular overarm is used on the new horizontal machines and also its standardized flanged spindle end. The No. 14 taper hole in the spindle is also standard. The spindle is of chrome nickel steel, heat treated and hardened, and has a large diameter bearing. Adjustment for end play is made against the column immediately behind the front bearing. The full range of spindle speeds can be used without making any adjustments.

In addition to the features outlined above centralized oiling for the knee, saddle and table; rear control; multiple disk clutch running in oil and double starting levers are common to all of the new machines. Power rapid traverse is incorporated in the Nos. 2 and 3 high-power millers.

High-Power Millers Have Power Rapid Traverse

The power quick traverse on the high-power plain machines is operated by a single lever at the front of the saddle, after the positioning lever is located. Moving this lever to the right or left causes the table to travel at the rate of 100 in. per min. in either direction, and when the operator's hand is removed the lever returns automatically to the stop position. Directional control, or movement of the feed engaging levers in the direction that the table is to travel, is incorporated as in the company's previous machines of this type, as is also rear control of all feeds so that the operator can stand behind the table and operate the machine efficiently.

Set-up changes are said to be made quickly on the high-power millers because of the ease in shifting the rectangular overarm, the use of the power quick traverse, which runs independently of the spindle, and the general convenience of controlling all movements of the machines. The starting levers, one on each side of the column, extend to the front within easy reach from any operating position. Pulling down on the starting lever applies a brake that stops the spindle instantly.

The sliding gear transmission of the high-power machines provides 16 spindle speeds. There are never any gears in engagement except those providing the speed being used, which is claimed to minimize strains considerably, reduce power losses and increase efficiency.

The base of the high-power units is a double box section heavily ribbed, providing rigid support to the column. It forms the reservoir for the cutting lubricant which enters through removable drip screens. The knee bearing on the column is unusually long, and a tapered gib which is adjustable lengthwise provides a close fit. Knee clamps are unnecessary. The saddle is long and deep, and the table bearing is as wide as the table itself, there being no overhang on either edge. The bearing surfaces of the knee, saddle, table and column are chilled.

All of the mechanism within the column including the feed box is automatically lubricated by a pump system. The knee, saddle and table are lubricated from five stations, individual oil holes having been eliminated. The reservoirs and oilers are large, conveniently located and can be filled quickly from a large mouth oil can.

High-Power Vertical Miller

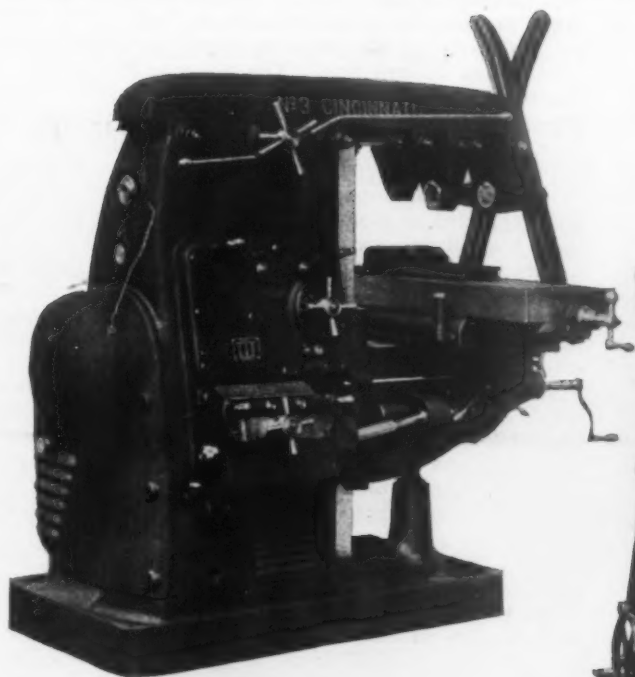
The new No. 3 vertical high-power miller has the pyramid form column, and is similar in design to the No. 3 horizontal miller, except that the horizontal spindle has been replaced by the vertical spindle mounted in a moveable head. The spindle bearings are located a fixed distance apart in the main head casting, which is gibbed securely to the column of the machine. The vertical head is arranged for hand movement either at a fast rate through the pilot wheel or through the worm and worm wheel combination at a slow rate. When operated on production manufacturing work, the entire mechanism can be locked.

All gears are alloy steel and heat treated. The main driving gear on the spindle and the spindle itself in strength and general proportions have been materially increased. The spindle is chrome nickel steel.

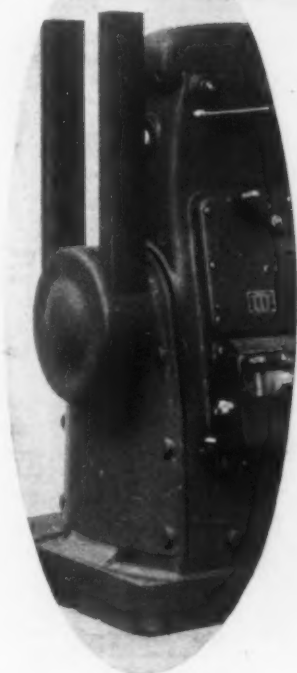
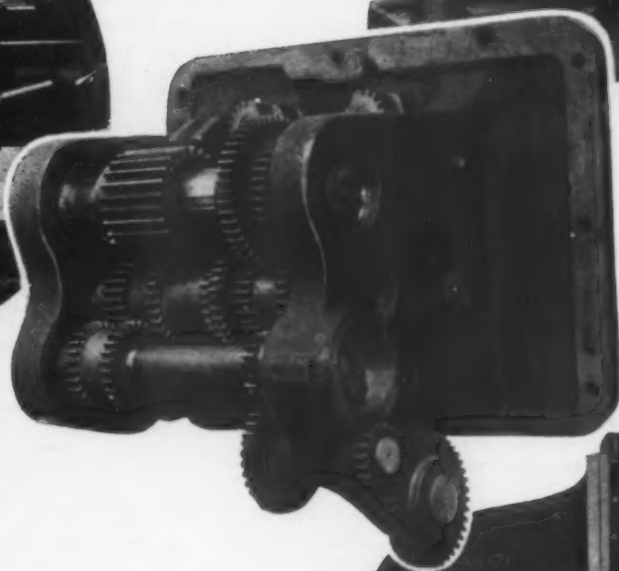
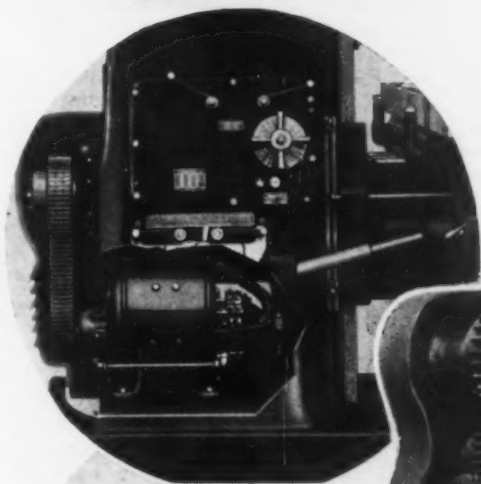
For jig boring, where it is desirable to utilize the power feed to the head rather than the power vertical feed to the knee, the machine may be equipped with power feed to the spindle head. A compact feed mechanism replaces the worm box at the right side of the head, and four changes of feed in thousandths per revolution of the spindle are obtained by sliding gears. Feed changes can be made instantly from the front or operating position by a single lever. The power feed to the head can be engaged in either direction by a lever at the front which indicates the direction in which the head will move. A standard 20-in. circular milling attachment, for making dies, cams and similar work as well as for continuous milling, is available as an extra.

"M" Type Machines for Tool Jobs and Manufacturing

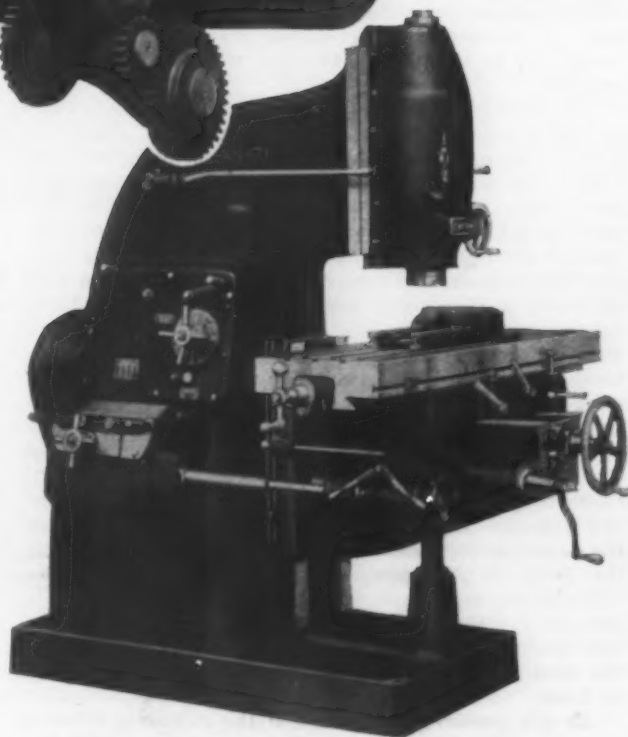
Tapered roller bearings in the spindle drive, "pyramid" form of column, rectangular overarm and standardized flanged spindle end described in connection with the high-power machines are also features of the "M" type millers. All mechanism within the column is

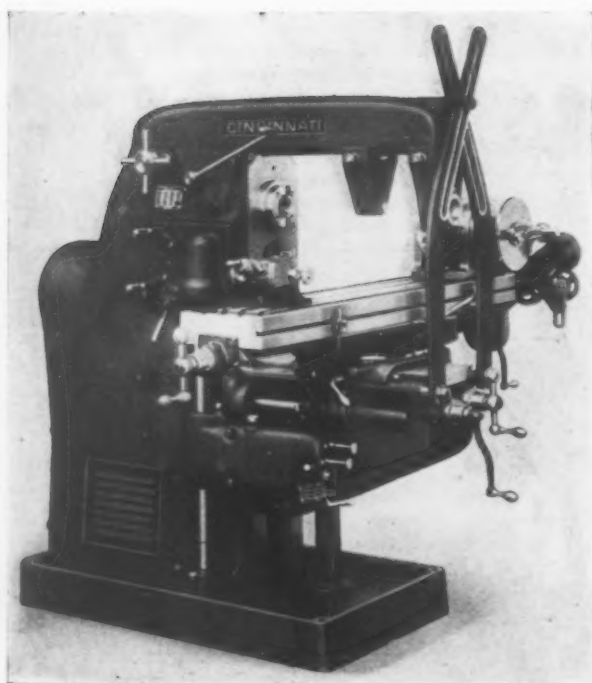


NEW Pyramid Column Cincinnati Milling Machines. The illustrations at the left are: (Top) right-hand rear view of Nos. 2 and 3 high-power machines arranged for inclosed motor drive; (center, in circle) column broken away to show mounting of motor; and (bottom, in oval) view of rear showing arrangement for overhead belt drive



THE Illustrations at the Right Are: (Top) right-hand side view of Nos. 2 and 3 high-power machine; (center) close-up view of speed change mechanism of same machines; and (bottom) left-hand front view of the new No. 3 pyramid column vertical Cincinnati milling machine





Left-hand Front View of New Cincinnati M-type Universal Milling Machine

lubricated automatically and the knee, saddle and table are oiled from centralized stations, as in the heavier machines.

Ease of operation is provided for, feed and speed changes being made from the front of the machine.

The sliding gears permit instantaneous changing while the machine is running and the feed box is located at the front of the knee to permit convenient selection of any desired feed. The machine is started and stopped from either side by means of double starting levers. A spindle brake is connected with the starting lever. Power cross and vertical feed engaging levers are located at the front of the knee. The machine may be started and stopped, and the spindle speeds and feeds changed by the operator, without shifting his feet from the normal operating position.

The knee of the "M" type machine has a solid top with unusually wide saddle bearing, 12½ in. Smooth and uniform cross adjustment is said to be obtained because of the narrow guides, and using the cross feed extremely accurate boring being possible.

A tapered gib connection to the column is intended to eliminate the necessity for clamping the knee even when taking heavy cuts. A single piece vertical screw instead of the usual telescope screw is employed, permitting accurate dial readings. Saddle bearings are as wide as the table itself, and as long as the full table travel.

The "M" type verticals are available in the fixed head type only. All vertical adjustments are made through the knee. With the exception of the upper part of the column and its mechanism, the vertical machines are identical with the plain "M" type millers. A standard 16-in. circular milling attachment for making dies, cams and similar work, as well as for continuous milling, is available.

Twelve spindle speeds from 20 to 419 r.p.m. are provided on the "M" type millers, there being also 12 feeds, ranging from ¼ to 20 in. per min. Spindle reverse is included with the machine. The net weights of the motor-driven machines, exclusive of motor, are: 1-M, plain, 3600 lb.; 2-M plain, 3800 lb.; 1-M universal, 3900 lb.; 2-M universal, 4100 lb.; 1-M vertical, 3350 lb.; and 2-M vertical, 3500 lb.

Horizontal Pipe Bender

Pipe benders, heretofore manufactured by Pedrick Tool & Machine Co., 3640 North Lawrence Street, Philadelphia, have been hand operated, but this company is now building a pipe bender up to 2-in. capacity, especially designed for electric motor drive. The illustration shows the comparative simplicity and unity of the new horizontal power-driven machine, which may be set up to operate on the job, wherever current is available.

The face plate is geared to revolve within the cavity of the horizontal table, so that the gear teeth are entirely covered and guarded. The bending roll, on the central stud, is bolted stationary and the bending arm, which moves with the face plate, wipes the pipe around the roll. The other end of the pipe rests against a small saddle located on the resistance arm. This latter piece has free radial movement, being held wherever desired by a dowel pin in holes around the face of the table.

This provides an important application, because the bending arm and the resistance arm may be brought close together to bend short pieces of pipe that have been cut off and perhaps threaded. A "stop" bolted to the face plate is provided, so that any quantity of the same shape may be bent, with the assurance that each piece is subjected to a uniform bending movement and consequently will register with the others when the "stop" makes contact with a pin suitably located in the holes in the edge of the table. From one size roll almost any shape may be obtained. The roll is grooved for the diameter of pipe to be bent and governs the radius of the bend. The arc through which the face plate is turned controls the degree or angle of bend.

In the power-driven machine the motor is allowed to run while the machine is in operation, and the hand lever affords start, neutral and reverse positions

at the wish of the operator. The horizontal table is convenient on which to handle, lay out and measure the work and also permits bending long pieces at middle of length, which is often necessary in hand-rail work, running pipe lines, etc.



Pipe Up to 2 In. in Diameter May Be Bent. Motor drive and horizontal arrangement of the table are features

NEW INTERNAL GRINDER

Cycle of Operations Fully Automatic—Operator Only Loads and Unloads

A new internal grinding machine which is fully automatic as to its cycle of operations and is therefore particularly adapted to the production grinding of ball bearings, gears and similar parts has been placed on the market by the Heald Machine Co., Worcester, Mass. Loading and unloading of the work-holding fixture and starting the machine is all that is required

feed, it having gone back to grinding speed or if desired a slower grinding speed.

The grinding is continued until the hole reaches finish size when a second electric contact is made, the sizing box again operating the levers which control the dogs, and the table and wheelhead goes out of the work at full speed. The workhead stops, the water is shut off, and the machine is at the rest position, ready for another cycle of operation.

The simplicity of control may be noted from Fig. 2, which shows the inside of the magnet box, with the sizing indicator thrown out of the work. As the size of the piece of work being ground approaches finish

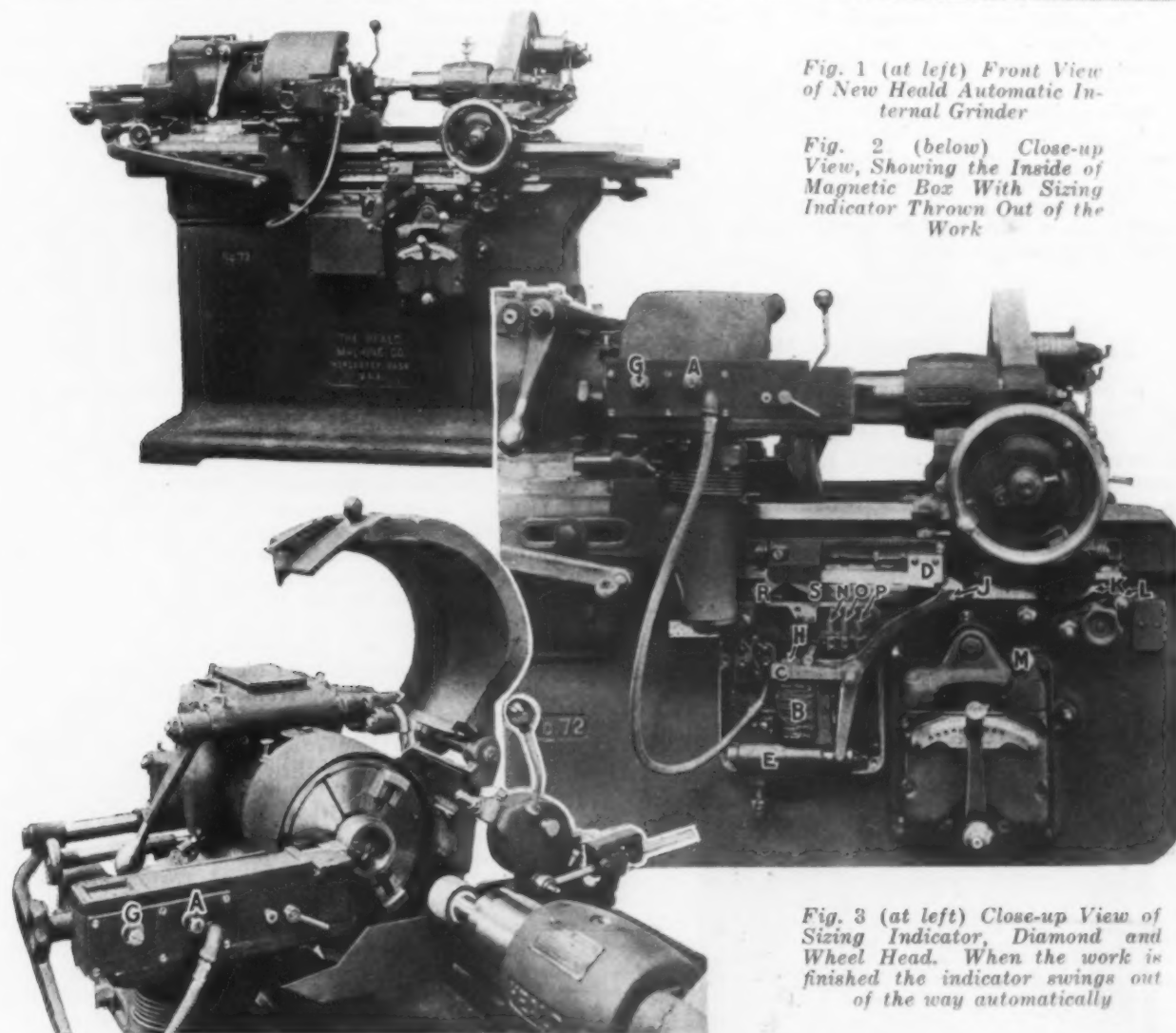


Fig. 1 (at left) Front View of New Heald Automatic Internal Grinder

Fig. 2 (below) Close-up View, Showing the Inside of Magnetic Box With Sizing Indicator Thrown Out of the Work

Fig. 3 (at left) Close-up View of Sizing Indicator, Diamond and Wheel Head. When the work is finished the indicator swings out of the way automatically

of the operator. The capacity is for grinding holes up to 6 in. in diameter and 6 in. deep. The machine was developed from and incorporates many of the units, including the size indicating and controlling device, of the company's semi-automatic internal grinder, which was described in THE IRON AGE of July 2.

The work fixture having been loaded and the machine started the cycle of automatic operation is as follows: The wheelhead advances to the work at high speed, slows down to grinding speed and is fed into the work automatically at the desired roughing feed. The size indicator, which operates in the hole, controls further movements of the machine and as the hole approaches finish size an electric contact is made which operates the levers that release the sliding dog, allowing the wheelhead to withdraw automatically from the work just far enough for the dressing of the wheel.

The diamond then drops into place automatically, the table slows down to the proper dressing speed and the wheel is trued. The wheel immediately starts grinding again, the feed having changed to a fine finish

size, a contact is made at A sending a current through magnet B which pulls down lever C, lifting the latch which controls sliding dog D and permits the table stroke to be amplified just long enough so that the wheel passes by the diamond. At the same time that the lever is operating the sliding dog, it opens a valve in cylinder E, permitting the oil to flow through pipe F to the diamond bracket pushing the diamond down into position for truing.

Having finished truing the wheel, the diamond is raised back into rest position by a cam on the table. Lever C and dog D return to their former positions and the wheel continues to grind. When the finish size has been reached, a second contact is made at G which sends the current into a second magnet directly back of B and which controls lever H. When this is pulled down against the magnet, it lifts dog J which causes the table to withdraw to the rest position. As the table goes to the latter position, bar K hits roll L which opens the pressure valve wide, and the table withdraws at full speed. The operator having chucked a new

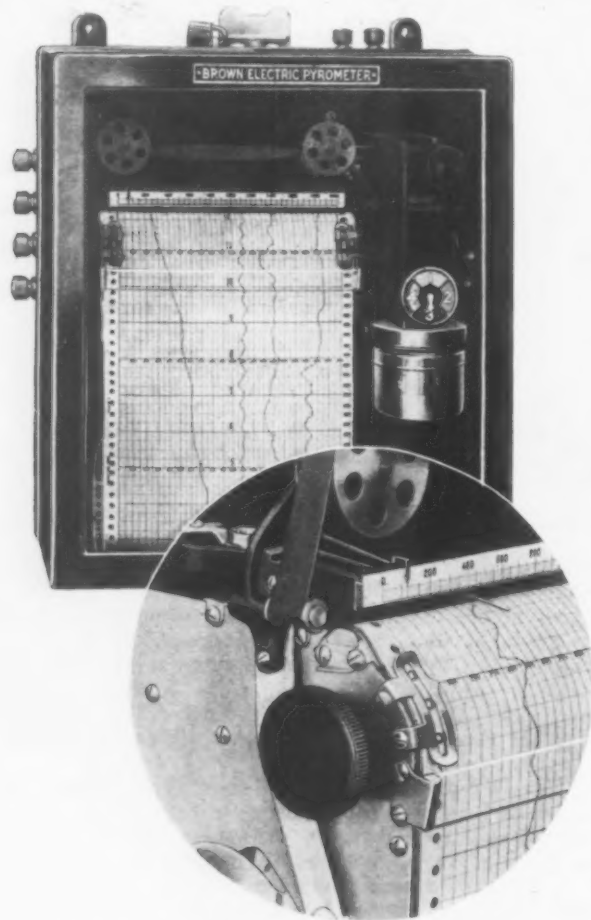
piece, throws the lever *M* to the left and the wheel returns to the work at full speed until bar *K* runs off of *L*, when the wheel assumes a set grinding speed and the cycle of operations is gone through again.

To control the electric current to the correct magnet, a switch attached to the cover of the box is arranged to operate in connection with terminals *N O* and *P*. Terminal *O* is always alive and the switch previous to the operation of the truing dog is across *O* and *P*. As the dog is returning to position, after the wheel has been trued, the switch is thrown across *N* and *O* so that the current will go into the second magnet that controls lever *H* operating the withdrawal lever when the work is finished. Fingers *R* and *S* operate the switch at the proper time.

The sizing unit is shown in Fig. 3, the indicator being shown in position with the diamond pointed finger which runs on the surface of the hole at all times. As the whole approaches finish size contact *A* is made and upon finishing, contact *G*. When the work is finished the indicator box swings out of the way automatically permitting of access to the work. The position of this control box may be adjusted for holes of various diameters and lengths. It can be permanently swung out of the way to permit truing up a new wheel or grinding a master hole.

New Brown Recording Pyrometer

A new recording pyrometer has been developed by the Brown Instrument Co., Philadelphia. It has a die cast, black enameled aluminum case 15 in. high, 14 in. wide and 9 in. deep. The wall space occupied is unusually small considering the wide chart used, as shown in one of the illustrations. It is built to make a single record, a duplex record with two records side by side,



Simplicity and Compactness Are Features. The width of the chart is 7 in. and single, duplex and multiple records may be made. The insert illustration shows the marking ribbon moved back to make the record visible

The cross slide having automatic coarse and fine feed gives a change that is mechanical and positive, taking place just before the diamond trues the wheel. This change of feed as well as change of speed in unison with the truing of the wheel is stressed as a vital factor in obtaining a straight round hole without bell mouth, and also aids production because heavy roughing cuts can be taken without fear of oversize. The cross slide is also arranged with a stop which assists the operator when it is necessary to change wheels and run the slide back to take care of the larger new wheel. It also gives the correct position of the cross slide relative to the work so that grinding can be started immediately.

The wheel truing device is positive in operation and is adjustable for position. It is hydraulically operated and its movement is controlled by the third amplifying dog, while it is brought back into position by a cam on the table.

As in the semi-automatic machine, the table is driven by a hydraulic arrangement. It is controlled by three dogs, as in the previous machine. The machine is regularly driven from an overhead countershaft, but a two motor drive arrangement is available. The weight of machine is 5500 lb. net. The floor space occupied is 49½ by 90 in.

or, in multiple form, as many as 12 records on one chart.

It operates on the frictionless principle in which a pointer swings freely and at intervals of every 30 sec. is depressed on a carbon or ink ribbon, producing a mark on the chart. A continuous line is thus produced, so close together are the marks. The mark is produced on the front side of the paper where it shows clearly and the ribbon in the single and duplex records, after each mark on the chart, is moved back disclosing the last impression so that the record is clearly visible. Directly below the driving roll a glass knife edge is provided for tearing off the paper which can be accomplished two hours after the last impression is made.

The galvanometer and the recording chart mechanism is carried on a hinged frame. When swung aside the galvanometer is instantly accessible. Besides recording the temperature on the chart, an indicating scale is provided with chart figures legible at a considerable distance. The chart has rectangular coordinates and the time lines are straight across the chart. An electric clock drives the recorder if alternating current is available. Six recorders are claimed to consume only the current required by the common 25-watt incandescent light. Hand winding is eliminated by the use of the electric clock and no governor or other means is needed to secure accurate timing. The speed of the chart is 1 in. an hour, but, by reversing two gears, a speed of 4 in. an hour is obtainable. Combinations for speed are available from ¼ in. to 6 in. an hour.

As a pyrometer the instrument incorporates an automatic cold junction compensation, including the Brown index for adjusting a compensated pyrometer to the correct initial starting point on open circuit. The multiple recorder switch includes a dial with index for indicating the number of the thermocouple or furnace which is being recorded at the time. The record lines are made in different color combinations on the chart and the switch dial is colored to correspond.

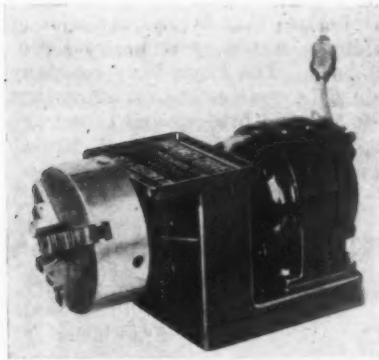
New Body Makers' Clamps

J. H. Williams & Co., Buffalo, N. Y., have brought out a new line of C Clamps, especially designed for body makers' service. They are drop forged from a special steel and are heat-treated to secure maximum stiffness. The throat is deep, giving generous clearance.

The screws are drop forged in one piece, without handle or wings and are recessed and rounded for easy hand grip. Swivels are provided on all sizes. The clamps are made in capacities from 4 to 10 in. for use in the various wood and metal manufacturing fields.

Reamer Drive for Bench Work

Designed to grip firmly for reaming electrically such parts as bushings, connecting rods, pistons and the like, is the



Motor-Driven Reaming Device for Bench Work. The space occupied is 7 x 15 in.

new power machine manufactured by the Geo. H. Blettner Co. of Chicago. This machine is rated to remove 0.020 in. of stock with each pass of the reamer from bronze bushings up to 1½ in. in diameter and babbit up to 2½ in. The spindle is provided with a geared scroll chuck which ac-

commodates reamer shanks up to 1¼ in. in diameter.

The adaptability of this electrical device to bench work is a feature, and makes it a handy tool in machine shops, and automotive and railroad repair shops. It is easily and quickly mounted on the bench and occupies a space of 7 x 15 in. The machine is operated by means of a Westinghouse ¼-hp. motor and the regular running speed is 38 r.p.m., accomplished by means of a balanced gear reduction running in oil.

New Double-Head Threading Machine

The Landis Machine Co., Waynesboro, Pa., is bringing out the ½-in. double-head threading machine, illustrated, which is intended for cutting threads and for tapping nuts, either right- or left-hand, within a range from ¼ in. to 2 in.

The machine has a geared headstock and single pulley drive. Four speeds are available, the die head speeds being 157, 226, 315 and 441 r.p.m. The machine may be equipped with a leadscrew attachment prior to its being placed in service. Only one leadscrew



Double-Head Threading Machine for Motor Drive. The motor is mounted on a plate on top of the headstock

is required for each carriage and the changes in pitches are taken care of by the substitution of gears. The die head is opened and closed automatically at predetermined limits by the carriage, or by hand. The vise has a horizontal side-wise as well as a vertical centering adjustment, which feature is stressed as assuring permanent alinement with the die.

Cooling lubricant is supplied at the die head by means of a rotary pump, and a special control valve

is provided at the die head for shutting off the oil supply when necessary. The frame of the machine is cast in one piece. The machine may be conveniently converted to motor drive. A 1½-hp. 1200-r.p.m. motor is employed, the motor being mounted on a plate on top of the headstock. Power is transmitted from the motor shaft to the drive shaft of the machine by belt.

The floor space occupied is 4 ft. 1½ in. by 3 ft. 2½ in. The net weight of the belt driven machine is 1300 lb. and of the motor driven machine, 1750 lb.

Flexible Shaft Equipment for Grinding, Polishing and Other Uses

Flexible shaft-equipment for drilling, grinding, polishing and buffing, screw driving, cleaning of castings and boiler tube cleaning and other uses is being placed on the market by the Biax Flexible Shaft Co., Inc., 136 Liberty Street, New York.

Portable machines equipped with electric motor drive are being offered, one of the units adapted for grinding the seams of heavy castings and welded joints, being here illustrated. The motor is fully in-



Hand Pieces and Tools Are Interchangeable, Adapting the Equipment to a Variety of Uses

closed and is dust proof, and ball bearings are used throughout. For heavy drilling the worm gear angle drilling apparatus shown at the end of the flexible shaft, is provided. The grinding wheel attachment, shown in the foreground within the loop formed by the flexible shaft of the machine illustrated, is equipped with an outer hand piece and protective cover. Wire and horsehair brushes and other fittings are available, as well as various types of drill chucks, including a two-jaw chuck with adjustable overload release.

The machine is equipped with a flexible shaft 10 ft. in length. The casing of the shaft has an inner lining of spring steel strip which permits it to be bent without the risk of breakage or kinks. Shafts are available in any length up to 30 ft. For universal couplings, there is an end piece and end pin so that the shaft may be used on standard electric hand drills or directly connected to an electric motor. All hand pieces and spindles, as well as the motors, are mounted in ball bearings.

The hand pieces and tools used on the machine are interchangeable by means of Morse taper fittings, so that with one universal outfit, a variety of work including grinding, drilling, polishing, screw driving, nut setting and burnishing may be done. For safety, as well as to save time and labor, it is frequently advisable to use the shafts with a four ballbearing clutch hand piece for stopping and starting the tool while allowing the motor and shaft to continue running. Machines arranged for traveling on an overhead rail are also offered by the company. Pedestals for belt drive are available, and a driving head piece for rope drive may be furnished. Boiler cleaning units with flexible shafts are manufactured in three standard types, including one for removing incrustations and for cleaning tubes, and another for cleaning large surfaces.

Steel Companies to Combat Stream Pollution

Organization of a group of Ohio steel companies to combat acid pollution of the State's streams was perfected at a meeting in Columbus, Ohio, on Aug. 27, called by Dr. John E. Monger, director of the State department of health. J. D. Waddell, of the Waddell Steel Co., Niles, Ohio, who was elected temporary chairman, was empowered to appoint an executive committee to be named from the six steel districts in Ohio. These are classified as Cleveland, Canton, Youngstown, Ohio river, Mansfield and western Ohio. District organizations will be formed to take up the question of preventing acid pollution.

A permanent State body will be set up in the fall, when a general meeting will be held. At that time a research committee will be appointed. Twenty-five steel plants were represented at the Columbus meeting and it was the consensus of opinion that a plan can be worked out whereby acids may be recovered to an economic advantage. In the past measures taken to prevent stream pollution have been by neutralization. The process is a dead loss to the industries involved.

Kokomo Steel & Wire Co. Sold

Sale of the Kokomo Steel & Wire Co., Kokomo, Ind., to the Keystone Steel & Wire Co., Peoria, Ill., has been consummated, subject to approval by stockholders of the latter organization. Each company is credited with a capacity in plain wire of 80,000 net tons per annum and the two a combined rating of some 250,000 tons of steel ingots.

Steel Men in Florida

Theodore A. Gessler, who was New York sales manager for the American Sheet & Tin Plate Co. until three years ago, has organized the Four Way Realty Corporation of Miami, Fla., associating with him several friends in the steel industry. H. Harrison Fuller has resigned his position with the Bethlehem Steel Co., having had charge of sheet and tin plate sales at the New York office, to join Mr. Gessler.

The other associates are: C. A. Timmons, for more than 25 years with the American Sheet & Tin Plate Co. at its Elwood, Ind., plant and at sales offices in Chicago, St. Louis and New York, but lately with New York sales office of the Bethlehem company; W. P. An-

draws, formerly with the American Sheet & Tin Plate Co. in New York; George Damerel, who was with the Weirton Steel Co., and John B. Kingsley, formerly with the American Car & Foundry Co.

Mr. Gessler has spent a part of each year since about 1910 in Miami and emphasizes that large quantities of steel for bridges, buildings, water systems, road construction, etc., will be used. The Four Way company will operate for a time as a real estate exchange but its charter empowers it to build bridges and to engage in other construction activities. Its address is 341 Northeast Second Avenue, Miami.

Puddling Rates Reduced 50 Cents a Ton

YOUNGSTOWN, Sept. 1.—Tonnage rates for puddlers in mid-Western plants subscribing to the sliding scale wage agreement of the Amalgamated Association of Iron, Steel and Tin Workers are reduced to \$11.13 per ton for the September-October period, from \$11.63, paid in July-August. The rates paid bar iron finishers are likewise reduced about 4 per cent. These reductions follow a decline in the average selling price of bar iron shipped during the 60 days ended Aug. 20 by subscribing interests, to 1.95c. per lb., from 2.05c., the average two months ago.

The examination of sales sheets was conducted at Youngstown. M. F. Tighe of Pittsburgh, president of the Amalgamated association, represented the workers, and James H. Nutt, Youngstown, secretary of the Western Bar Iron Association, the employers.

The bi-monthly settlement to determine the September-October tonnage rates for workers in union sheet and tin mills will be conducted about Sept. 10 at Youngstown.

Want Another Extension in Jones and Laughlin Rate Case

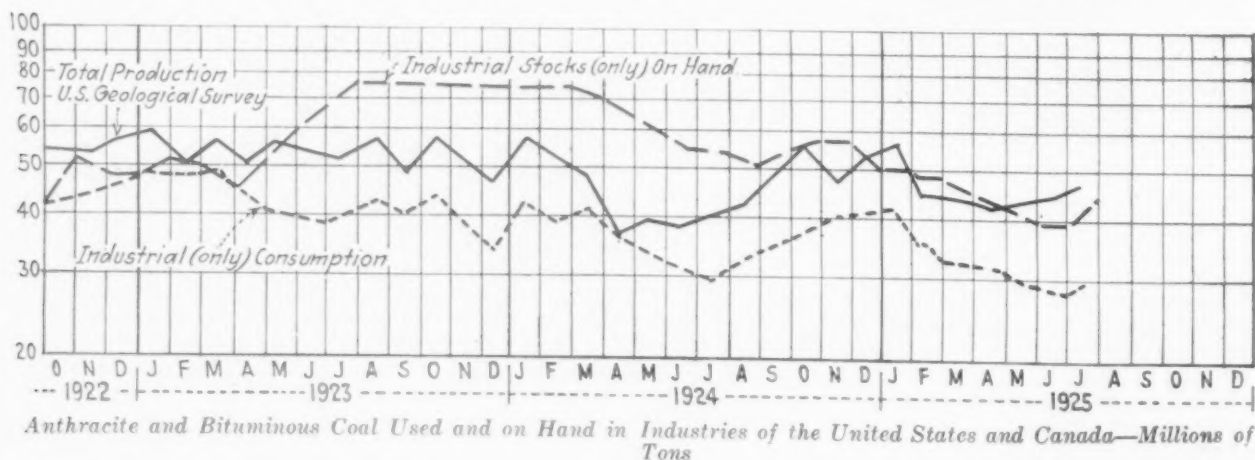
CHICAGO, Aug. 29.—Shippers and receivers of finished iron and steel, as well as interested railroads, held meetings in Chicago this week, at which they concurred in the view that additional time would be required to work out rate changes necessitated by the Interstate Commerce Commission's decision in the Jones & Laughlin case. In a petition which has been forwarded to the commission, it is asked that a further extension be granted of at least 60 days beyond Oct. 18.

Industrial Consumption of Coal

Estimates of the daily consumption of coal in industry, worked out month by month by the National Association of Purchasing Agents, New York, show that the consumption this summer has been the lowest of the past three years. In fact, with the exception of July of last year, the months of May, June and July this year are the only ones in three years which have

fallen below an average of 1,000,000 tons per day.

In the diagram will be found lines showing production, industrial consumption and industrial stocks on hand, from October, 1922, to the end of July, 1925. The estimated production in July was 47,846,000 tons, with industrial consumption 29,195,000 tons and stocks at the end of the month amounting to 46,273,000 tons.



WIRE ROD FREIGHT RATE

Development of Manufacture Traced—No Reason to Assume Round Section Is Only One

WASHINGTON, Sept. 1.—An interesting sketch of the development of the wire rod, together with a comprehensive description of the processes in the manufacture of iron and steel, is contained in a brief filed with the Interstate Commerce Commission by Attorneys Clark & LaRoe, Washington, for makers of wire rods against the proposal of railroads in official classification territory to limit the application of wire rod rates to rods that are round shaped in cross section. The effect of the proposed tariffs, if permitted to go into operation, would be to eliminate from the commodity item rods that are hexagonal or rectangular in cross section and to give them substantially higher class rates. The brief points out that the identical issues have been considered by the commission before and that in each case its findings have been adverse to the contentions of the carriers. For many years, it is pointed out, unfinished materials, known as bolt, nail, rivet and wire rods, have been included in the billet list, for rate-making purposes.

The brief goes into interesting detail in describing the development of the wire rod and processes of steel manufacture, for the purpose of proving that the shape of the rod should have nothing to do with the rate on it, because the method of manufacture is the same, and that a wire rod is not necessarily round in shape. As a matter of fact, it is pointed out, flats and hexagons are used by manufacturers to draw nothing but wire.

Development of the wire rod, the brief says, as a raw material for the manufacture of wire, has been traced back about 6000 years. One exhibit put in evidence was a copy of a photograph showing the rolling of flats or rectangles about 1629. Flats were apparently the only section rolled at that time, it is stated. Photographs dating back to 1780 also were submitted, showing the rolling of rectangular rods. These photographs bring out the fact that rectangular rods were rolled at least 25 years prior to the granting of the first patents for the production of rounds by rolling and they show clearly, says the brief, that the rolling of rounds was a development out of the rolling of other simpler sections.

"They tend to prove, also, that there is nothing to indicate that the round is the basic section, or that other sections are elaborations from the rounds," says the brief. "In fact, all the evidence, both historical and practical, is the other way."

Charge of Dumping Indian Pig Iron Inconclusive

WASHINGTON, Sept. 1.—Inconclusive findings only are contained in a report of the anti-dumping unit in New York just made to the Customs Division, Treasury Department, regarding the complaint of Eastern merchant blast furnace interests against so-called dumping of Indian pig iron into the United States. It is the purpose of the Customs Division to cable to the American Consul General at Calcutta, India, and obtain, if possible, a more detailed statement than has been received so far as to the home market value of pig iron in India. The information disclosed from the investigation has been insufficient to afford a comparison of the home market value with the sales prices made to the United States and other export markets or to make comparison of the export market values as required by the anti-dumping act.

Two obstacles in particular have been encountered. One is due to the fact that Indian iron for domestic use is sold in only small lots, f. o. r. (free on rails) works, as against wholesale quantities in which the iron is sold when for shipment abroad. Another difficulty is found in the fact that the iron sold in India is quoted by the particular grade while in sales abroad the tonnage of the different grades, including different

kinds of foundry as well as of steel-making iron, is lumped together and an average price arrived at for purpose of invoicing.

It was found that considerable tonnage had been sold by Indian makers to foreign markets, particularly to the United States and Japan, while the report made by the Consul General gave only small lots sold at home and did not segregate the prices of the grades of iron sold abroad. Doubt has been expressed that these details can be learned, but an effort will be made to ascertain them.

Jobber Cooperation in Simplification Movement

The National Supply & Machinery Distributors Association, whose general offices are at 505 Arch Street, Philadelphia, is cooperating with the Division of Simplified Practice, Department of Commerce, Washington, in an effort to bring about simplification of various products handled by these distributors.

Among the products which members of the association have recommended for attention are:

Bolts, machine screws, Swiss pattern files, cast iron and malleable fittings, auger bits, rules and tapes, pliers, screw drivers, socket wrenches, lock washers, steam gages, radiator valves, oil and grease cups, abrasive materials, cotton and wool wastes, valves and fittings, link chain and attachments, tackle and snatch blocks for manila and wire rope, die stocks and holders, cutters and reamers, lathe dogs, round adjustable dies, screw hooks and eyes, brick and plastering trowels, escutcheon pins, wood screws.

Progress on New Blast Furnaces

Construction work is proceeding on five new blast furnaces, and the progress of the work indicates that three of these stacks will be making iron by Jan. 1, 1926. The stoves of the furnace of the Hudson Valley Coke & Products Corporation, Troy, N. Y., are completed and the stack is about 90 per cent finished. It is expected that the furnace will be ready for production soon after Nov. 1.

At Johnstown, Pa., where the Bethlehem Steel Corporation is replacing one of its old furnaces with a new one, the work has so far progressed that it now seems likely that the furnace will be making iron soon after Oct. 1. Another furnace at this plant is being remodeled, but when it will come into production cannot be stated definitely at this time. At least three of the old furnaces at this plant will never again be operated, because the expense of rehabilitating them would be too great. The new furnace nearing completion was started with an idea of replacing, in point of output, two of the old-type furnaces.

Work on the new stack of the Central Furnace Co., subsidiary of the Central Steel Co., Massillon, Ohio, is progressing steadily, the stoves being practically completed. It is expected that iron will be made in the furnace on, or soon after, Jan. 1, 1926.

Another Company to Use Ohio River for Shipments

CINCINNATI, Sept. 1.—The Belfont Steel & Wire Co., Ironton, Ohio, has purchased an oil burning towboat equipped with a Diesel engine and is having barges constructed for service on the Ohio river, according to reports received here. This carrier will begin to operate before the end of the year and will be used for the transportation of pig iron, nails and wire manufactured by the company.

Freight traffic during the first half of 1925 amounted to 212,509,796,000 net ton-miles, according to the Bureau of Railway Economics. This was an increase of 3.8 per cent over last year, but was 5.8 per cent under the first half of 1923. June, with 35,863,078,000 ton-miles, showed an increase of 12.2 per cent over last year, but a decrease of 5.6 per cent from 1923.

Coal and Coke Production Show Gains; Prices Are Firmer

Greater Industrial Activity and Threat of Strikes Aid Bituminous Output; Coke Prices on Upgrade

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

THE bituminous coal situation is showing signs of improvement. Production is increasing simultaneously with advances in price. Although the threat of a hard coal strike is largely responsible for the strength in bituminous prices and the sharp increase in stocks, the improvement in general business is a factor which cannot be ignored. Industrial production has passed the low point for the year, and expansion is again taking place. The Federal Reserve Board Index of Production in basic industries increased during July. Inasmuch as coal production is closely correlated with industrial production demand for bituminous coal ought to increase for some months to come.

Normally the July production of bituminous coal increases about 2 per cent over June production. During July, 1925, however, production increased about 6 per cent, making a net gain of approximately 4 per cent greater than normal (Fig. 1). The production of bituminous coal in July was 17 per cent above the 1921 average as compared with 12 per cent below that average in July, 1924.

The daily average production increased during the first half of August. Prices also advanced. *Although it is impossible to segregate the improvement due to better business from that due to strike threats it is safe to conclude that the consumption of bituminous coal has increased, and will show further gains.*

Coke Prices Rise

THE production of by-product coke increased very slightly in July, while the production of beehive coke registered a decline. The July production of coke fell a little more than one per cent below the June total (Fig. 2). The rate of decline has tapered off so that it is less sharp than that of July, 1924, the low point of last year. Coke production for August will show some gains, upward of 3000 additional ovens having been lighted in recent weeks.

During the first half of July, furnace coke prices were at bottom levels, but due to the increases toward the end of the month the average price for July showed a slight gain over that of June (Fig. 2). The price of

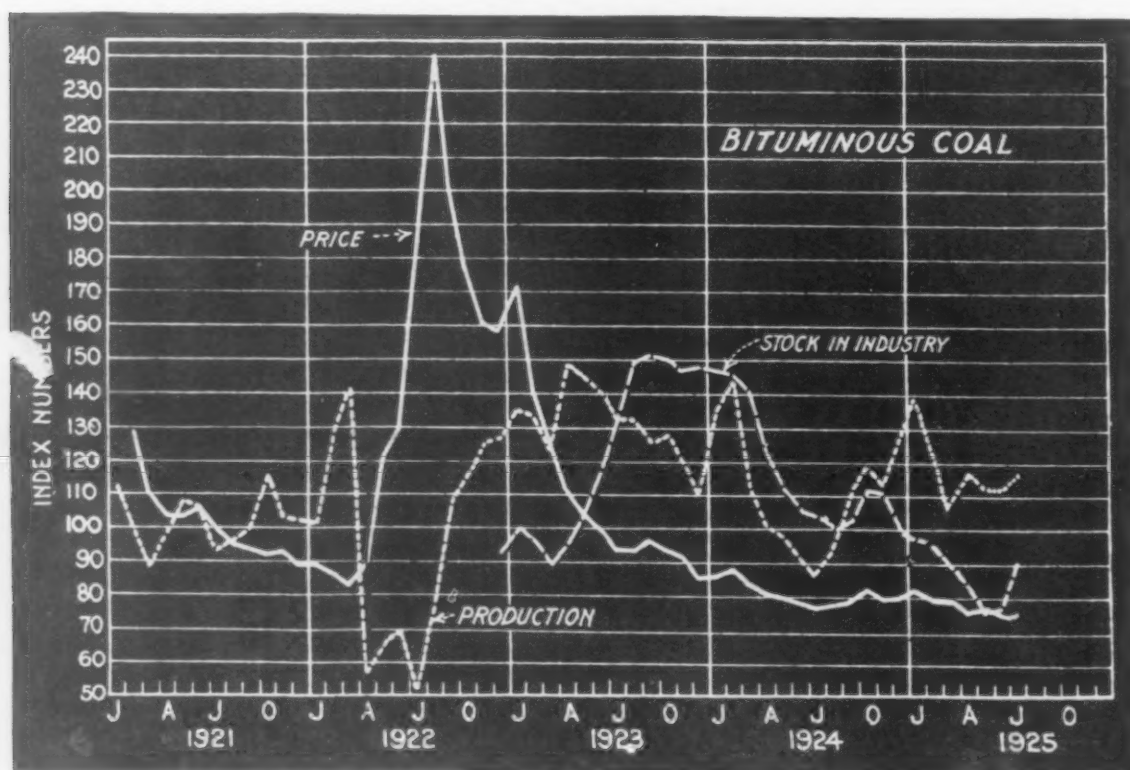


Fig. 1—With the Increase in Fall Business and a Threatened Period of Idleness Ahead for Hard Coal Miners, the Coal Trade Anticipates Firmer Prices

In This Issue

Do the railroads need many more freight cars?—Figures show little to be gained by mere replacement for sake of increased capacity, while present rolling stock is ample for country's transportation requirements.—Page 625.

Anthracite miners strike while bituminous miners need employment.—Only solution is a readjustment of labor in the coal fields.—Page 624.

Strike threats boost coal and coke prices.—Production and prices are advancing simultaneously; about 3000 coke ovens lighted in recent weeks.—Page 620.

Marked expansion in output of electric alloy steel castings.—More alloy steel made last year in proportion to total steel output than ever before: 2,000,000 ton mark again exceeded.—Page 610.

Seven months machinery exports \$30,000,000 above last year, same period.—While imports gain less than \$1,000,000 in same time. July exports gain over June, imports drop.—Page 657.

New bonus scheme demands more than long attendance from workers.—Suggestions, general merit, value to company, to determine whether extra shall be paid.—Page 624.

Preheating steel for oil-hardened dies gives more even hardness.—Practical heat-treating foreman suggests slow heating of furnace and metal to 500 deg. F. before placing die in furnace.—Page 608.

August iron output 1.5 per cent over July, 1299 tons increase in daily rate.—For first time since March pig iron production shows upturn, two furnaces net increase.—Page 632.

Severn P. Ker advocates recheck of steel capacity.—Agrees with John A. Topping that 51,000,000 tons annually is nearer right than 58,000,000 tons.—Page 633.

Correlation exists between mechanical and magnetic hardness.—Tests on hardened ball bearing rings show relation within the hardness range investigated.—Page 606.

Stocks of zinc decrease, prices advance.—Number of retorts in operation at end of July less than at beginning of month; shipments exceed output.—Page 623.

Rapid advance in steel treating due to painstaking research of early, unselfish scientists.—Pyrometric and material testing inventions responsible for much of the progress made in last 40 years.—Page 593.

Welsh non-ferrous metal industries show decreased operations for first half of 1925.—Nickel industry only non-ferrous trade to prosper.—Page 658.

A complete list of the exhibitors at the National Steel Exposition, Cleveland, together with notations as to items on display and personnel at the booths will be found in this issue, beginning with page 605.

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The Iron Age and Its Readers

IN presenting an unusual volume of special material on steel treating two weeks in advance of the annual convention of the American Society for Steel Treating at Cleveland this month, THE IRON AGE believes that its readers will appreciate the added time thus given for the consideration of contributions preparing the way for this important meeting. Notable among these is the story, not heretofore told connectedly, of the development of the science of steel treating.

Added to these special articles are full details as to the persons to be met and the things to be seen at the exhibition at Cleveland, and an extra insert of more than 100 pages in the advertising section, devoted to apparatus and equipment of particular concern to metallurgists and production executives. To point out that these advertising pages contain much information which is of direct value to those engaged in the manufacture or use of steel is but to say that these are "reading pages" in the true sense of the phrase.

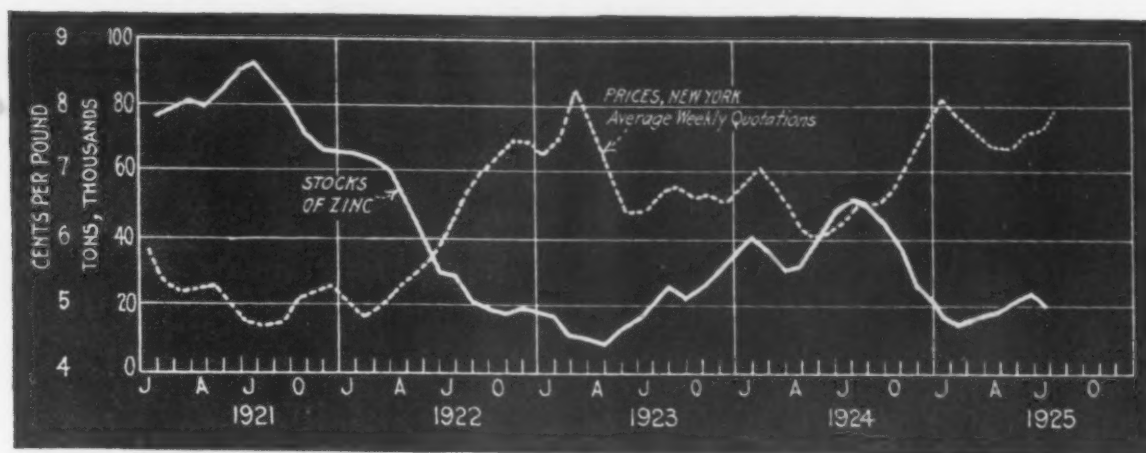


Fig. 3. The Increase in Zinc Prices and the Depletion of Zinc Stocks Indicates a Sizeable Gain in Consumption. Prices should be fairly firm for the immediate future

furnace coke has steadily increased since the middle of July, and on Aug. 25 stood at the highest point since the end of March. The average price for August rose to a level above that of last April.

The coke price has been largely strengthened by the same factors as the price of bituminous coal, namely, better business and the fear of a coal strike.

Zinc Position Stronger

STOCKS of zinc decreased somewhat during July, offsetting the June increase (Fig. 3). At the end of the month they had receded to a level equal to that of last May. Although zinc stocks are near the 1925 peak, they are far below the 1924 peak which was reached in July of last year. Furthermore, they have fallen to a slightly lower level than that of last December, when stocks touched the low point of 1924.

The number of retorts in operation at the end of July was slightly smaller than a month previous. Total primary production of zinc, however, increased 3.6 per cent during July as compared with June, and was nearly 11 per cent greater than production in July, 1924. Shipments exceeded production as is indicated by reduced stocks.

THE IRON AGE price of zinc at New York averaged 7.56 cents per pound in July. Although this was a fairly sharp increase over June it amounted to only one-half of the increase from July to August (Fig. 3). The August average price of 7.94 cents has been exceeded just twice during the period shown; once in March, 1923, and again in January, 1925. The price of zinc on Aug. 25 stood at 8 cents. This is the highest weekly quotation since Jan. 20. From the 1925 peak of 8.225 cents on Jan. 13 the price fell until it reached a low of 7.15 cents on April 21, and since that date has moved irregularly upward. Since the middle of June, however, the advance has been unchecked.

The increase in zinc prices and the decrease in zinc stocks in the face of increasing production indicate a high level of demand from consumers. Moreover, in spite of the high level of zinc production, it seems fair to conclude that the setback since early 1925 was a temporary interruption of a major upswing which has again been resumed. Finally, there is nothing in the statistical position of zinc to indicate that in the immediate future prices will fall substantially below present levels.

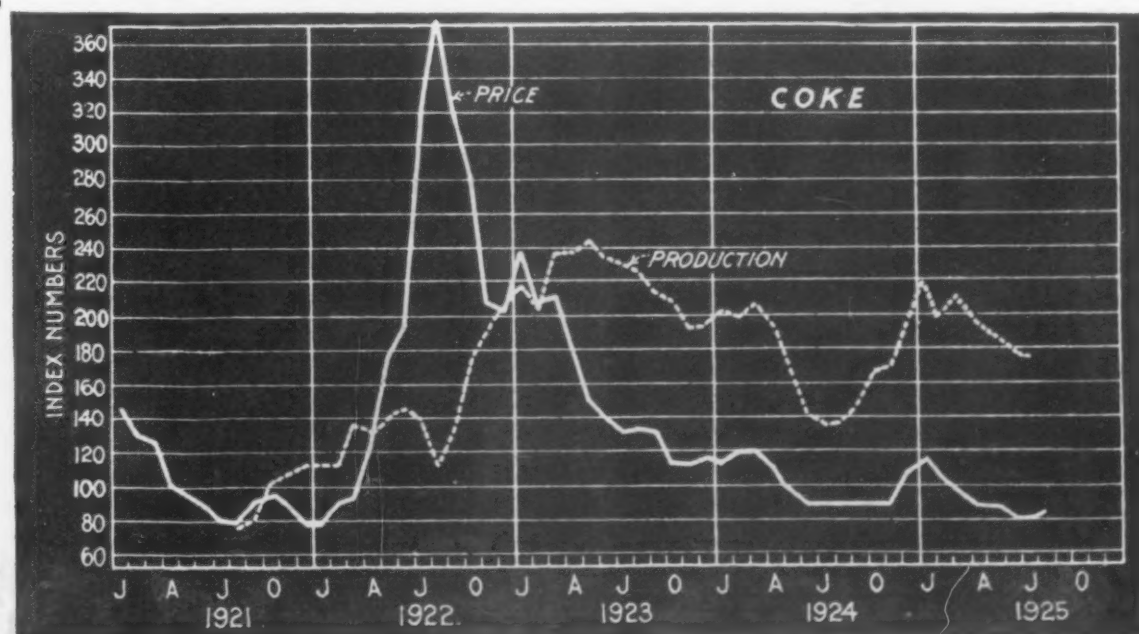


Fig. 2. Toward the End of August Coke Prices Had Reached the Highest Point Since Last March, Despite the Large Increase in Production

ESTABLISHED 1855

THE IRON AGE

A. I. FINDLEY, *Editor*

W. W. MACON, *Managing Editor*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York
C. S. BAUR, *General Advertising Manager*

F. J. Frank, *President*

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 239 West 39th Street, New York. Charles G. Phillips, *Pres.* A. C. Pearson, *Vice-Pres.* F. J. Frank, *Treas.* H. J. Redfield, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 425 Park Square Building. Philadelphia: 1402 Widener Building. Cleveland: Guardian

Building. Detroit: 7338 Woodward Ave. Cincinnati: First National Bank Bldg. Buffalo: 833 Ellicott Square. Washington: 536 Investment Building. San Francisco: 320 Market St. London, Eng.: 11 Haymarket S.W.1.

Subscription Price. United States and Possessions, Mexico, Cuba, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 25 cents.

Entered as second-class matter, June 18, 1879, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

PRINTED IN U. S. A.

The Coal Situation

WITH the anthracite strike on, the public so far has evinced a calm indifference. As between operators and miners its opinion is, "A plague on both your houses." The indifference of the public is reflected in the composure of Washington. Probably both operators and miners would have liked to draw in the Federal Government to make a settlement. A position of disregard, with an intention of promoting the use of substitutes, is the last thing that either operators or miners want to see. We prophesy therefore that they will make an early settlement on the basis that was.

Yet, what a ghastly economic situation is there in the whole coal business. The public wants anthracite, but for some reason or other it is not allowed to have it cheaply, and sometimes there is a cessation of the production of it. On the other hand there is a superfluity of bituminous coal and of the miners who dig it. The situation of the idle bituminous miners is pitiful. In Great Britain there is a situation among them that is not dissimilar.

What solution is there for such problems? It is not to be found in the enforced payment of the Jacksonville scale, as the union leaders in this country would have, nor in the Government making good the industrial deficit, as has just been done in Great Britain. Common sense teaches that when an industry is distinctly overmanned the superfluity of workers should be transferred to other industries. In a national economy there is always work to be done by everybody. The only obstacle is proper adjustment.

It is not to be expected that the human mind will ever be able to operate the intricate economic machine in perfect balance, with entire absence of vibration, knocks and misfires, but a specific problem is not incapable of correction. The Federal Department of Labor, the unions, and everybody could unite in explaining to the bituminous coal miners the situation that exists among them, in respect to which there is common agreement, and in promoting their migration to other places and other industries.

But would organized labor assent to any such

thing? Would it not reason that such a movement would increase competition in other places and in other industries and thus tend to reduce wages at them and in them? To organized labor the idea that human service is a commodity, and in the market is obedient to commodity laws, is anathema. Nevertheless, organized labor conducts itself as the greatest of all believers in that idea.

* Bonus for Worthy Workers

A COMPANY manufacturing electrical supplies has put into effect a bonus system for its employees which is a radical departure from the accepted idea. Instead of making the plan automatic in its operation, based as such plans usually are on workers' earnings and length of continuous service, it differentiates between employees who in the year have proved valuable to the company and those who have failed to make the most of their opportunities to further their employer's interests. The company does not engage to pay a bonus to all of its people, no matter what their term of employment may be.

According to the Industrial Conference Board's description of the plan, at the end of a year a survey is made of each employee's record in all of its phases as affecting the industry to determine whether he should receive a bonus and, if so, how much. General merit and the number and value of accepted suggestions, as well as length of service, will be considered as chief factors. A definite bonus schedule is provided for salaried employees, one per cent of average salary the first year, two per cent the second, and so on up to five per cent in five years. Yet the salaried person will not be sure of receiving this award. He must show something in his record other than long service.

An unusual slant of the plan is that the lower the worker in the scale of shop employment, the higher the price the company pays for a suggestion that is accepted. For example, where superintendent, foreman and hourly wage worker make

suggestions of equal merit, the superintendent would be considered as entitled to \$10, the foreman to \$25 and the worker to \$50. The theory seems to be that those higher up are already paid to produce economies and greater efficiency and higher excellence of product, while the worker's wage is considered to cover only the application of his own skill.

The theory of this plan is, of course, that the deserving profit under it and the undeserving do not. Doubtless, too, it will be administered with the nearest possible approach to justness. Those who are rewarded may be as a consequence the more efficient and loyal and helpful. Some of those who are passed by in the awards may be impelled to better efforts. Others, however, may harbor resentment, in their failure to see that they were undeserving. They may charge injustice or favoritism. Perhaps the system may help to weed out the incompetents and those who lack ambition.

Generally speaking, any form of bonus that depends largely upon the judgment of an individual starts with a handicap. In a company of any size, the final judge must depend for a large part of his knowledge on the reports of his subordinates. Prejudice for or against may creep in, despite all vigilance. Employees may suffer injustice, or what they believe to be injustice. For this reason most employers have avoided a responsibility of this character.

Freight Car Buying

EVEN those who take only a general interest in the steel trade situation, or consider only the salient features, observe that the outlook for activity is good in all important consuming lines with one exception. Orders for freight cars have been notably light for nearly five months, and show little signs at the present time of increasing. On the other hand the building trades continue very active, as witnessed by well sustained bookings in fabricated structural steel; the oil and gas industries are very active, and the agricultural implement and automobile plants are running at very good rates. Thus the freight car building situation is conspicuous. Orders at the car shops have been running out rapidly, operations have been greatly reduced in the past few weeks and there is not much business on books.

In the circumstances the July report on freight cars just issued by the American Railway Association is of particular interest and repays careful scrutiny. Totals for all the roads covered are given below:

Freight Cars, July, 1925

	Number	Pounds Capacity
July 1 total.....	2,361,060	210,460,742,867
Installed in July...	10,542	1,008,370,000
Retired	10,051	768,168,148
Aug. 1 total.....	2,361,551	210,700,944,719

At the end of July there were on order at outside shops 26,087 cars and 8189 building in company shops, a total of 34,276 cars. At the rate of installation in July, this total represents 3¼

months. Generally speaking from the experience of the past few years, the July rate was a moderate one, and a rate 50 per cent above it would be a distinctly high rate. The number on order is such that installations at the July rate cannot possibly be expected in future.

The question has been much discussed, whether the railroads need to buy many more cars. That the existing equipment is physically adequate for the performance of a large volume of freight service is proved by the fact that the thing has been done. Statistics both of number of cars loaded and of number of ton-miles of service have made new high records. The question is reduced to one of economy—whether it would be more economical for the railroads to discard many more cars and replace them with cars that would involve less expense. In the past five years many freight cars have been installed and many retired, the net change being insignificant relative to the total of installations or retirements. The total capacity has been materially increased, by the cars installed being of much greater capacity than those retired.

The report for July, however, does not show a very great difference. The average capacity of all cars at the end of July was 44.6 net tons per car. The cars installed in July averaged 47.8 tons and the cars retired 38.2 tons. The installations ran less than 8 per cent in capacity above the average and the retirements only 14 per cent below the average. This does not seem to suggest a great deal to be gained by retirements and installations.

Some railroad men may object to this analysis as leaving much unconsidered, but it seems to have value nevertheless. The fact that, since the return to private ownership five years ago, the railroads have retired and installed many cars is as much an indication that they may have largely accomplished the rehabilitation as it is an argument that the activity must continue.

March of the Alloy Steels

RECORDS made last year in the alloy steel industry again confirm predictions made only a few years ago. In proportion to the country's total steel production, more alloy steel of all grades was made in 1924 than ever before. For the second year in succession over 2,000,000 tons was produced. A review of the industry on other pages shows that alloy steel output went to 5.35 per cent of the country's total, compared with 4.70 per cent, the best previous record. In 1923 the ratio of total steel to alloy steel was 21.3 to 1; last year this dropped to 18.7 to 1. Only 16 years ago 131.6 tons of steel was made to 1 ton of alloy. Thus since 1909 the American alloy steel industry has seen a seven-fold expansion—a truly notable achievement.

In one other respect the 1924 record was unusual. The proportion of alloy steels made in electric furnaces was the largest in recent years. Of the 2,026,409 gross tons of alloy steels, 188,563 tons, or 9.30 per cent, came from electric furnaces. Substantial gains were also made in electric alloy cast-

ings. Over 28,800 tons, or 15.33 per cent of the total electric alloy steel, was made in electric foundries.

There is no hazard in saying, in the light of the progress made in the past two years and of the continuing developments in the practice of users that the march of the alloy steels has only started. Progress in ferroalloys, electric furnaces and heat treatment will be the real measure of the advance. Demand for alloy steels from the motor industry has been the mainspring of the movement, but there are just ahead increasing requisitions from other industries, as for locomotives and structural steel. The production of stainless iron on a commercial scale is not far off and that may yet prove a factor of no small proportions.

Poor Distribution of Work

THERE is much truth in the remark that it is the obvious that escapes attention. Certainly it is obvious that work is not uniformly distributed among the different classes of workers in the United States. The adjustment might be made by the work being altered or by men changing their vocations.

We all want to work because that is necessary in order to make a living, and all want to make as good a living as possible, except a few hundred thousands—some make the estimate a million—constituting "the unemployable."

This week the anthracite miners, about a sixth of a million, ceased work. In the past year there has been idleness among bituminous coal miners aggregating the equivalent of full time employment for approximately as many more. In the building trades there is part time idleness of those technically employed, by short hours and by insufficient performance. Among railroad workers there is idleness with pay by regulations which put too many men on a repair job.

The fact is there is an unlimited amount of work to be done. This is fully recognized by the few who think, and is inconceivable by the great mass of the people. There is an ample supply of men in the country able to think up new things for us to do if we are willing to work and labor union regulations do not interfere.

It would not be necessary to tax the creative faculties of these men, however. There are old things on which much more work would be done were it not for the restrictions. The automobile and the dwelling house furnish good illustrations.

In quality of material and workmanship, not to speak of refinements and improvements in design, one gets much more for his dollar in an automobile than before the war. In a dwelling house he gets about half as much. No one foresaw what a large demand there would be for automobiles. It would be ridiculous to maintain that there would not be a corresponding demand for dwelling houses if there were similar return for the dollar—a demand for more houses, larger houses and better houses.

During the past four or five years efficiency in production has greatly increased. With nearly all classes of goods there is production with less time and effort. It is elementary that this should make for greater prosperity and comfort for the people as a whole. There should be more goods and facilities to enjoy; but a requisite is that the opportunity to work be afforded and embraced, and that the rate be such that people can afford to buy the product.

If we maintain a large enough mass of restrictions, however, increase in efficiency in production simply throws more people out of employment and we tend toward business depression instead of toward greater activity and prosperity.

A LITTLE more than two years ago the attention of steel makers and metallurgists was arrested by published results of experiments with zirconium in steel. The claims were in some respects sensational, particularly as regards the effect on sulphur and phosphorus. The use of zirconium in steel making has increased measurably and with quite satisfactory results. Recent statistics afford one measure of the growth of this use. Brazil is the source of most of the zirconium ores used in the United States. The domestic output is small. Whereas in 1919 imports were 11,023 pounds, for 1924 they were reported at 619,220 pounds—more than a 55-fold increase in five years. It will be recalled that the introduction of vanadium in American steel making was a slow process. Today it is considered essential to the production of certain types of alloy steels. It is assuming a good deal to draw a parallel between the two metals, especially in view of some conflict of testimony respecting the effects of zirconium, but there is at least the suggestion, in the increased consumption cited above, that the makers of special steels are receptive to innovation and alert to every possibility of improvement.

New Books Received

Journal of the Institute of Metals. Vol XXXIII. Pages 710, 5½ x 8½ in., illustrated. Issued by the Institute of Metals, 36 Victoria Street, London, S. W. 1, England. Price, 31s. 6d.

Fundamentals of Business Organization. By Webster Robinson. Pages 230, 5¾ x 8¼ in. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$2.50.

American Petroleum. Supply and Demand. By the Committee of Eleven of the American Petroleum Institute. Pages 269, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$3.

Factory Organization and Administration. By Hugo Diemer. Pages 398, 6¼ x 9¼ in., illustrated. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$4.

The Employment of Young Persons in the United States. Pages 150, 6¼ x 9¼ in., illustrated. Published by the National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, \$1.50.

Transactions of the American Society of Mechanical Engineers. Vol. XLVI, 1924. Pages 1370, 6¼ x 9¼ in., illustrated. Published by the American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York.



Exhibits Forging and Bolt Machinery

Some 62 Machines, Many New or Redesigned, Shown to Unexpectedly Large Numbers at Tiffin by National Machinery Co.

MANY forging and bolt heading machines of new design were shown in operation and new methods were demonstrated at a notable machinery exhibition held by the National Machinery Co., Tiffin, Ohio, at its plant, Aug. 21 and Aug. 24 to 27. This exhibit showed that remarkable progress had been made in the past year in the manufacture of forging machinery, both in the increase of production speed and in the improvement in quality of the finished product. A large number of forgings were exhibited showing the wide range and accuracy of work that is now being done on forging equipment. Forgings on some of the new machines are being made down to limits of 0.001 in. Dies were shown and also photographs of the different operations on some of the more interesting forging work.

The exhibit included 62 machines, many of which have been brought out or redesigned during the past few months and had not been previously announced to the trade. About 20 of the machines, including those of new design, were under operation, several on intricate and unusual work and illustrating the widened range of work that can be produced by forging. The machines were well arranged for exhibition purposes throughout the plant, and in other sections regular production work was carried on without interruption. Skilled demonstrators were on hand to explain the operations of the various tools.

The exposition was unique in that it brought to the plant of the machinery manufacturer a large number of heads of companies using forging equipment, engineers and shop executives in various lines and particularly bolt and nut makers, automobile manufacturers and railroad men. These came from all parts of the country, nearly every State in the Union being represented. A similar exhibit was held by this company 15 years ago and while successful, it was on a small scale as compared with the one just held.

The attendance exceeded expectations, being between 1500 and 2000. The exhibit proved of so much interest that many remained two or three days to make a careful study of the equipment. While there were no efforts to make sales, several unsolicited orders for some of the new machines were placed by visitors. The

exhibit represented an approximate value of \$500,000.

Semi-hot Automatic-feed Machines

Probably the outstanding feature of the exhibit was a line of semi-hot automatic-feed bolt and rivet heading machines, although a new line of high duty heading and forging machines that included the redesign of an old line and many new sizes attracted almost as great an interest. The new semi-hot process for working the stock at low temperature for making rivets, track and carriage bolts, square and hexagon head bolts and for other work that can be done at a single blow, which is used with this new line of machines, is declared to be a step forward in reducing the manufacturing cost and in improving the quality of the product as compared with the hot process, in that the semi-hot method gives a cleaner and better finished product at a lower cost for heading. As the heat of the work is not above about 1400 deg., it is kept below the scaling temperature. The absence of scale is held to eliminate excessive wear on the slides and at the same time the metal is heated sufficiently to obviate annealing. The lower temperature, it is pointed out, reduces the heating effect on the dies so that they are likely to last much longer than otherwise. Another important feature claimed for the process in the saving of costs is that with the low temperature the work does not have to be annealed as is customary in cold heading.

The semi-hot automatic feed header was shown in three sizes, $\frac{3}{8}$, $\frac{1}{2}$ and 1 in. The feed rolls of this machine are at an angle to the machine, thus compensating for the distortion caused by the dragging action of the shear. This, it is stated, balances the stock and aids in making larger and more difficult heads without fins and uneven flash. The grip time can be varied so that the dies hold the work only long enough for heading. This, it is stated, reduces the heating effect on the dies and increases their life. The dies and rolls are water cooled. One feature is a complete automatic oiling system. The capacity of the 1-in. machine is placed at 120 bolts per min.

The $\frac{3}{8}$ -in. semi-hot header is designed for product up to 4 $\frac{1}{2}$ in. in length and it is stated that it

makes the various sizes with single blows that require two and sometimes three blows on cool headers, thus giving it an unusual output. It has a remarkable speed record of 200 carriage bolts per minute. It is stated that this machine has made 72,000 $\frac{3}{4}$ x $1\frac{1}{4}$ -in. bolts in 6 hr. and that it has made 65,000 bolts with one groove of the die.

A new type of continuous heating furnace, which heats the stock for the $\frac{3}{4}$ -in. high speed header, together with a new stock coiler and welder attracted almost as much interest as the heading machine itself. The coiler opens up the roll of coil stock into loose loops and the material is fed from the coiler through the furnace to the header at the rate of 400 ft. per min. when $1\frac{1}{4}$ in. carriage bolts are being headed. When the end of the coil is reached, the end of another coil is electrically welded to the first. The continuous furnace was designed by A. R. Spencer, combustion engineer, Cleveland, who also designed the other heating furnaces. The furnaces are oil fired.

New Models of High-Duty Machines

The new models of high duty heading and forging machines designed for a wide range of product were shown in six sizes from 1 to 5 in. A feature of these machines is a quadruple abutment clutch which permits starting at $\frac{1}{4}$ revolution of the gear wheel, reducing fatigue of the operator and increasing speed. With this feature it is stated that many jobs can be finished with one heat that formerly required additional heating. These machines in some sizes, it is stated, can gather more unsupported stock at one blow than heretofore considered possible or $3\frac{1}{4}$ diameters of the stock on the upset. An unmounted bed frame of the 5 in. forging machine was exhibited. This is shorter and deeper and has longer slides than the former type. The machine frame extends 37 in. below the floor level.

Several interesting intricate operations were being done on these machines. One was the upsetting of the hexagon head of a socket wrench which was being done on the 1 in. machine. The head was expanded on the shank by piercing and the entire forging work required three operations. A $1\frac{1}{2}$ -in. machine was in operation, making an automobile drag link from bar stock requiring one upsetting and three piercing operations. This link is commonly made from tubing but it is claimed that it can be made cheaper by forging from stock. The link shown was made from a $\frac{3}{4}$ in. bar pierced $3\frac{1}{4}$ in., the head having an outside diameter of $1\frac{1}{4}$ in. when finished.

Another forging made on the same size machine was a grab handle for box cars requiring three forging operations—gathering the stock, forming the foot and punching the hole and removing the fin. This was followed by a bending operation done on a bending device on the top of the machine capable of bending any angle in any direction. A yoke made in five operations on a 2-in. machine showed interesting work in flattening and squeezing the stock in grip dies and punching out the web. A similar machine was making union buttons from bar stock without waste of stock.

Splitting operations were also featured, the stiff frame and good die alignment enabling the machines to do these operations. A 4 in. forging machine was in operation making $3\frac{1}{2}$ in. castellated nuts for locomotive side rods. On the 5 in. machine a gas engine pitman forging was made, this operation showing in particular the large gathering capacity of the machine and the power of the ram to fill out the details of the forging.

Included in the equipment was a new electric heater for automatically handling and heating $\frac{5}{8}$ and $\frac{3}{4}$ in. bolt blanks and having capacity for heating 1200 $\frac{3}{4}$ in. blanks per hr. The blanks are automatically fed to the electrical contacts and when brought to the proper heat they are delivered to the machine operator. The heater has speed controls so that it sets the speed for the bolt machine operator.

Continuous motion semi-automatic hammer bolt headers for making square, hexagon and T head finished bolts were shown in 1-in. and $\frac{1}{2}$ -in. sizes.

A 1-in. automatic bolt trimmer was one of the new machines exhibited. This trims the flash from both

square and hexagon head machine bolts and is declared to be an important link between the continuous automatic feed header and satisfactory low cost bolt making.

The exhibit included bolt pointers in a full range of sizes and lag screw gimlet pointers as well as bolt cutters in a full range of sizes from $\frac{3}{4}$ in. to 6 in. capacity. Some of these were in operation showing the accuracy of the dies.

Nut tappers were exhibited in the full range of sizes down to an $\frac{1}{8}$ in. machine that taps 250 nuts per minute and handles sizes down to a No. 2-56 nut. Other exhibits included nut burring machines, roll threading machines and shears.

While in Tiffin the visitors were guests of the National Machinery Co., by which they were very hospitably entertained. The company took over the hotel Shawhan during the exhibition and provided quarters elsewhere for those whom the hotel could not accommodate. A fleet of taxicabs was on hand for carrying the guests to and from the hotel, plant and depots. Two special days were held during the exposition. On the opening day, Aug. 21, the members of the International Railway Master Blacksmiths Association, which was holding its convention in Cleveland, went to Tiffin on a special train to visit the exhibit and on the closing day, Aug. 27, a large delegation of visitors were brought from Detroit by special train as guests of the company. Visitors during the week included W. T. Sharte, of Bauer & Sharte, a large bolt manufacturer in Germany, and L. Parent, of Fenwick Freres, machinery manufacturer representative in France.

Railway Car Institute Formed

The American Railway Car Institute, comprising about 30 manufacturers of railroad cars, has been formed and has taken over the functions of the Railway Car Manufacturers' Association. The new institute, however, differs from the former association in that it is an organization of individuals and not of corporations. The office of the institute will be at 61 Broadway, New York.

J. M. Hansen, chairman of the board of directors of the Standard Steel Car Co., becomes president of the American Railway Car Institute. W. C. Tabbert, who was secretary of the car manufacturers' association, continues as secretary of the institute.

W. F. M. Goss, who was president of the Railway Car Manufacturers' Association, retires. Dr. Goss has had a long career in engineering educational work and in railroad engineering work. He was dean of the departments of engineering at Purdue University and at the University of Illinois; he was a member of the jury of awards at the Chicago Exposition in 1893 and was chief engineer of a commission of investigation of smoke abatement and electrification of railroad terminals in Chicago in 1913 to 1915. He is the author of several locomotive engineering books and is a member of the principal technical societies.

Machine Tool Exhibit at Chicago

A comprehensive exhibit of machine tools will be held at the sales rooms of Manning, Maxwell & Moore, Inc., 27-29 North Jefferson Street, Chicago, during the two weeks, Aug. 31 to Sept. 12 inclusive. The machines of fourteen manufacturers will be operated under power by factory representatives. Most of the tools will be engaged on actual work of particular interest to the railroads. The exhibit will be simultaneous with the conventions of the American Railway Tool Foremen's Association and the International Railway General Foremen's Association, both of which are to be held at Chicago, the former on Sept. 2 to 4 inclusive, and the latter from Sept. 8 to 11 inclusive. The manufacturers and the machine tools which they will show are as follows:

Chas. G. Allen Co., Barre, Mass., high-speed ball bearing drill presses.

Boye & Emmes Machine Tool Co., Cincinnati, Ohio, engine lathes.

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., Bridgeport new pattern guide bar grinder and Bridgeport floor grinders.

Chambersburg Engineering Co., Chambersburg, Pa., hydraulic bushing press and a model of Chambersburg double end hydraulic car wheel press.

Columbia Machine Tool Co., Hamilton, Ohio, 32-in. heavy duty shaper.

Dresses Machine Tool Co., Cincinnati, Ohio, 5-ft. high duty plain radial drill.

Foster Machine Co., Elkhart, Ind., universal turret lathes.

Micro Machine Co., Davenport, Iowa, Micro Model "FG" locomotive air pump cylinder grinder.

Monarch Machine Tool Co., Sidney, Ohio, engine lathes.

Putnam Machine Works, Fitchburg, Mass., double end axle lathe and miscellaneous parts.

Rockford Milling Machine Co., Rockford, Ill., Sundstrand radius, link and valve motion parts grinder.

Superior Machine Tool Co., Kokomo, Ind., drill presses.

Thompson Machine Co., Springfield, Ohio, Thompson universal grinder.

Walter Stock Adjusting Machine Co., Toledo, Ohio, stock adjusting machine.

Metallurgical Fellowships and Their Program of Research

Eight appointments as research fellows and one as research engineer have been made, to conduct investigations of problems in mining and metallurgy this coming year, in cooperation with the United States Bureau of Mines, according to an announcement from the Carnegie Institute of Technology.

The appointees to mining fellowships are: Russell B. Cooper, Johnstown, Pa., University of Pennsylvania; Charles O. Hawk, Felicity, Ohio, Ohio State University; Garnet Phillips, Terre Haute, Ind., Rose Polytechnic Institute; Ben E. Hess, Huntington Park, Cal., California Institute of Technology, and H. F. McCullough, Scottsdale, Pa., special appointment as research engineer.

The following were named as research fellows in metallurgy: Abraham Grodner, Pittsburgh, Carnegie Institute of Technology; Ralph B. Norton, Eastondale, Mass., Massachusetts Institute of Technology; Gustave H. Pfeiffer, Terre Haute, Ind., Rose Polytechnic Institute, and E. A. Hertzell, Schuylkill Haven, Pa., Pennsylvania State College.

Included in the research program in mining and metallurgy at the Carnegie Institute of Technology for the next college year are: "Study of the Cause and Control of Abnormality of Case Carburized Steels," by C. E. Sims, electrometallurgist Bureau of Mines, and Ralph B. Norton, research fellow; "Study of the Open-Hearth Steel Furnace Atmosphere in Relation to Its Effect Upon Refractories," by Frederic W. Schroeder, assistant chemist Bureau of Mines, and Gustave H. Pfeiffer, research fellow; "Study of the Mechanism of Corrosion and the Factors Effective in Its Control, in Steam Power Plant Operation," by R. E. Hall, physical chemist Bureau of Mines, and E. A. Hertzell, research fellow; "Temperature and Heat-Flow Studies in Open-Hearth and Electric Steel Furnaces," by B. M. Larsen, metallurgist Bureau of Mines, and Abraham Grodner, research fellow.

Iron and Steel Electrical Engineers to Meet

Announcement is made of the twentieth annual convention of the Association of Iron and Steel Electrical Engineers, and the iron and steel exposition, Sept. 14 to 19, in the Philadelphia Commercial Museum, Philadelphia. The meeting will include technical sessions from Sept. 14 to Sept. 18. These sessions are as follows:

Sept. 14, 12:30 p. m., Safety Division luncheon and discussion; L. H. Burnett, general chairman; C. L. Baker, vice-chairman.

1:30 p. m. in the crystal ball room, Benjamin Franklin Hotel, introductory address by President A. C. Cummins. Addresses by L. H. Burnett and Henry A. Renninger. A paper, "How the Electrical Engineer and the Safety Engineer Can Be Mutually Helpful," by John A. Oartel, chief of safety bureau, Carnegie Steel Co., Pittsburgh.

All remaining technical sessions will be in the Philadelphia Commercial Museum.

Sept. 15, 9:30 a. m., D. M. Petty, chairman; "Selection and Maintenance of Oil Circuit Breakers," by George A. Burnham; another paper under the same title, by M. J. Wohlgenuth and E. K. Reed. Discussion at 1 p. m.

Sept. 16, 9:30 a. m., C. L. Proudfoot, chairman; two papers, "Direct Current Armature Windings for Multipolar Generators and Motors" and "Frog Leg Windings," by W. A. Powell and G. M. Albrecht.

Sept. 17, 9:30 a. m., George H. Schaeffer, chairman; joint session of electrical and combustion sections; "Electric Heat Treating Furnace Applications," by E. A. Hurme; "Electric Melting Furnaces," by J. A. Seede. Report of electrically heated soaking pit at Donner Steel Co., Buffalo.

Sept. 18, 9:30 a. m., R. S. Shoemaker, chairman; "Auxiliaries and Auxiliary Drives for Steam Electric Generating Stations," by A. L. Penniman, Jr., and F. W. Quarles.

11 a. m., W. P. Chandler, chairman; "Extending the Heat Cycle in Boiler Operation by Use of Preheated Air for Combustion," by J. G. Worker.

On Wednesday evening, Sept. 16, at 7:30, will be a lecture on the Diesel type engine, illustrated with motion pictures and delivered by George A. Richardson, Bethlehem Steel Co.

The fall meeting of the American Association of Brass Manufacturers will be held at the Hotel Hollenden, Cleveland, Sept. 10. William M. Webster, City Hall Square Building, Chicago, is commissioner.

COMING MEETINGS

September

American Society of Mechanical Engineers, New Haven Section. Sept. 8 to 11. Fifth annual machine tool exhibition, Mason Laboratory, Yale University, New Haven, Conn. Ernest Hartford, 29 West Thirty-ninth Street, New York, vice-chairman.

Iron and Steel Institute. Sept. 9 to 11. Fall meeting, University of Birmingham, Birmingham, England. G. C. Lloyd, 28 Victoria Street, London, S. W. 1, secretary.

American Society for Steel Treating. Sept. 14 to 18. Seventh annual convention. Municipal Auditorium, Cleveland. W. H. Eisenman, 4600 Prospect Avenue, Cleveland, secretary.

Association of Iron and Steel Electrical Engineers. Sept. 14 to 19. Annual convention and exposition. Commercial Museum, Philadelphia. J. F. Kelly, 513 Empire Building, Pittsburgh, secretary.

American Electrochemical Society. Sept. 24 to 26. Fall meeting, Chattanooga, Tenn. Colin G. Fink, Columbia University, New York, secretary.

National Safety Council. Sept. 28 to Oct. 2. Annual meeting, Cleveland. W. H. Cameron, 168 North Michigan Avenue, Chicago, managing director.

October

American Gear Manufacturers' Association. Oct. 1, 2 and 3. Semi-annual meeting, West Baden Springs Hotel, West Baden, Ind. T. W. Owen, 2443 Prospect Avenue, Cleveland, secretary.

American Foundrymen's Association. Oct. 5 to 9. Annual meeting, State Fair Grounds, Syracuse, N. Y. C. E. Hoyt, 140 South Dearborn Street, Chicago, secretary.

American Welding Society. Oct. 21, 22 and 23. Fall meeting, Massachusetts Institute of Technology, Cambridge, Mass. M. M. Kelly, 33 West Thirty-ninth Street, New York, secretary.

Change in Trumbull Steel Management

Merger with Otis Steel Co. Halted While Affairs of Trumbull Company Are Investigated — President Warner Succeeded Temporarily by Philip Wick —
James A. Campbell on Trumbull Board

CLEVELAND, Sept. 1.—Dissatisfaction with the plans for the merger of the Trumbull and Otis steel companies led today to the resignation of Jonathan Warner as president and director of the Trumbull company and the appointment of an executive committee of three members headed by James A. Campbell, president Youngstown Sheet & Tube Co., to have full charge of the plant when the directors are not in session. Mr. Campbell was also elected a director to succeed Mr. Warner.

Vigorous opposition to the terms of the merger developed yesterday among the preferred stockholders of the Trumbull company in Youngstown, who objected to the clause in the proposed terms of merger providing for the exchange of old preferred stock for the new, an arrangement which was claimed to place them on the same basis as the holders of Otis preferred stock. This has paid no dividends for over three years.

The various complaints resulted in an offer by Mr. Campbell to head a special committee to take over the management of the Trumbull company. A meeting of the Trumbull directors, which was scheduled to be held in Warren this morning, was shifted to Cleveland and took place at the offices of the Cleveland-Cliffs Iron Co. President Warner did not attend, but Mr. Campbell was present by invitation. After the conclusion of the meeting the following statement was given out this evening:

Statement of Trumbull Board of Directors

"At a meeting of the board of directors of the Trumbull Steel Co., held at Cleveland today, the following action was taken: The resignation of Jonathan Warner as president and director of the company was accepted. Philip Wick, Youngstown, a vice-president, was elected president temporarily to fill the vacancy caused by Mr. Warner's resignation. The vacancy in the board created by the resignation of Mr. Warner was filled by the election of James A. Campbell, president Youngstown Sheet & Tube Co., to the board. In the opinion of the board it seemed desirable that its creditor banks be represented on the board. William M. McFate, a director of the company, tendered his resignation, which was accepted; whereupon A. E. Adams, president First National Bank, Youngstown, was elected to the board to fill the vacancy caused by the resignation of Mr. McFate. Mr. McFate continues as a vice-president.

"The board decided to create an executive committee of three members, to have full charge of the plant, property and business of the company during such time as the board of directors was not in session. This executive committee was filled by the election of James A. Campbell, Philip Wick and A. E. Adams.

"In view of the fact that the audit of the company, now being made, has developed that there are certain material errors in the representations made by the Trumbull Steel Co. to the National City Co., we have agreed with the National City Co. to withdraw from sale the \$17,500,000 aggregate principal amount of debentures of the Trumbull Steel Co. which they had contracted to sell for the Trumbull Steel Co. under an agreement dated July 25. In view of the ascertainment of the errors in these representations, the board has arranged for a completion of the audit of the company in order that the exact position of the company as regards its assets, liabilities and earnings be available at the earliest possible moment. As soon as this audit and investigation are completed the stockholders of the company will be immediately ad-

vised of the result. In the meantime, everything possible will be done to fully safeguard the interests of the stockholders.

"The entire situation affecting the company, so far as the board of directors know it, has been fully stated to our banking creditors, and it is due to them to say that their attitude is most friendly and that we are assured of their most helpful cooperation. Pending the ascertainment of the exact situation of the company, as affects its assets, liabilities and earnings, obviously no action can be taken toward a merger, consolidation or sale, as it is necessary, before the board or the stockholders could act intelligently with regard to any such development, that they have before them a complete and accurate statement of the condition of the company.

"It is the opinion of the board of directors, based upon information at hand, that the condition of the Trumbull Steel Co. is fundamentally sound; that is, its plant, property and assets are sufficient in value to pay off all its debts, pay off its preferred stock at par, and leave a substantial equity for its common stock."

What Is Involved in Proposed Merger

In the negotiations for the merger of the Trumbull Steel Co., Warren, Ohio, and the Otis Steel Co. and Midland Steel Products Co., Cleveland, Cleveland and New York financial interests have appeared to be taking the most conspicuous part. In the face of reports of dissatisfaction on the part of some of the Trumbull stockholders, it is stated that a majority of the common stock of that company, as well as of the Otis company, is controlled by the interests which are working for the consolidation. E. J. Kulas, president of the Otis Steel Co. and of the Midland Steel Products Co., is scheduled to be president of the combined company. The Midland Steel Products Co., with plants in Cleveland and Detroit, is a large manufacturer of automobile frames, considerable of its product going to the Ford Motor Co. For a long time it has purchased the bulk of its steel from the Otis company.

The combined assets of the three companies are in excess of \$100,000,000. It is announced that the capital structure of the merged company, if the plans are carried out, will consist of \$30,000,000 in 6 per cent bonds, \$33,000,000 in 7 per cent cumulative preferred stock and 1,760,000 shares of no par common stock. The terms, which may be modified in some particulars, provide for an exchange of shares on the following basis:

One share of Otis Steel common for 1 share of new common.

One share of Otis Steel preferred for 1½ shares of new preferred, the exchange taking into account accumulated dividends of \$29 a share.

One share of Trumbull Steel common for 1 share of new common.

One share of Trumbull Steel preferred for 1 share of new preferred.

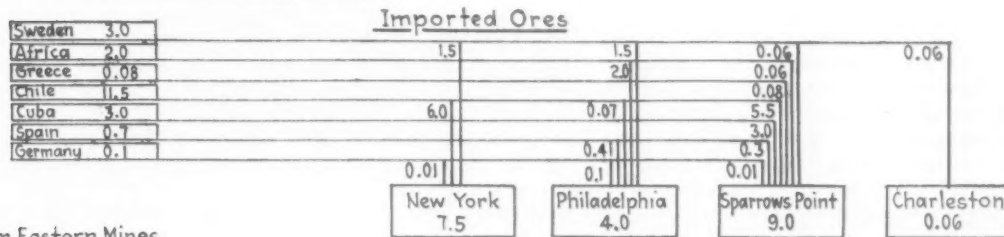
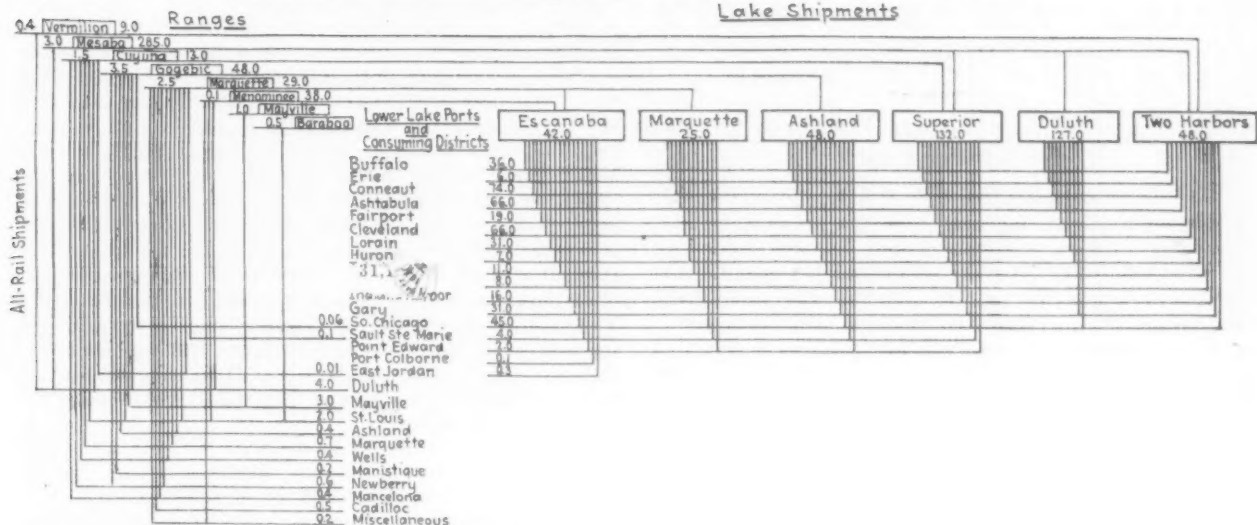
One share of Midland Steel Products common for 4 shares of new common.

One share of Midland Steel participating preferred for 1½ shares of new preferred, 2 shares of new common and \$10 a share in cash or new 6 per cent bonds.

The plans also provide for a bond issue of \$12,500,000 to be used to retire \$4,375,000 in 8 per cent bonds and \$4,600,000 in 7½ per cent bonds of the Otis Steel Co., to provide \$10 a share in cash or bonds for

(Concluded on page 647)

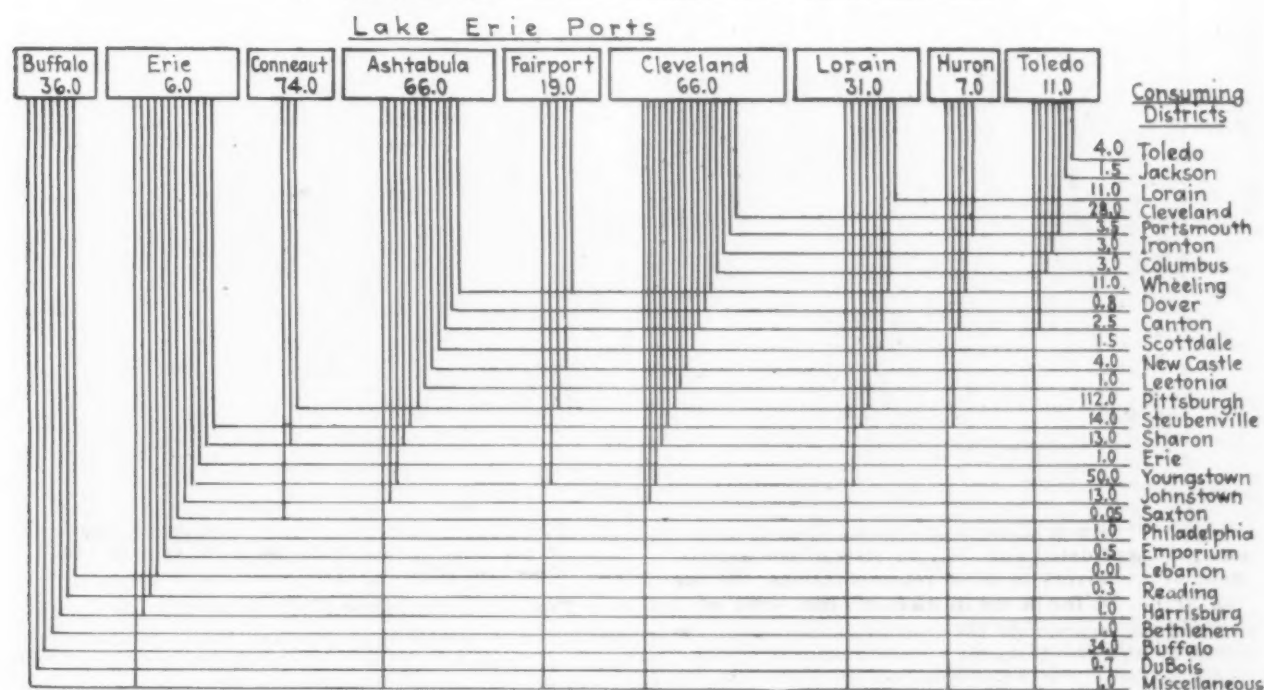
Where Lake Superior Ore Went in 1924



DISTRIBUTION
in 1924 of Lake Superior Iron Ores from Ranges Through Upper Lake Ports to Lower Lake Ports, and Direct All-Rail, to Consuming Districts Is Shown at Top. All figures in all cuts are in units of 100,000 gross tons.

In center is the distribution of imported ores through ports of entry, and of ores from Eastern mines, to consuming districts.

At bottom is the ore distribution from Lake Erie ports to consuming districts. These diagrams are from the Lake Superior Iron Ore Association.



AUGUST IRON OUTPUT

Net Gain of 2 Furnaces—9 Blown In and 7 Shut Down

Daily Rate 1305 Tons Larger Than July, a Gain of 1.5 Per Cent

For the first time since last March pig iron output in August made an increase over the previous month. According to data collected largely by wire and with the production for Aug. 31 estimated by most of the companies, the daily rate in August was 1305 gross tons higher than in July, an increase of 1.5 per cent.

The production of coke pig iron for the 31 days in August amounted to 2,704,476 tons or 87,241 tons per day, as compared with 2,664,024 tons or 85,936 tons per day for the 31 days in July. A year ago, or in August, 1924, the daily rate was only 60,875 tons per day.

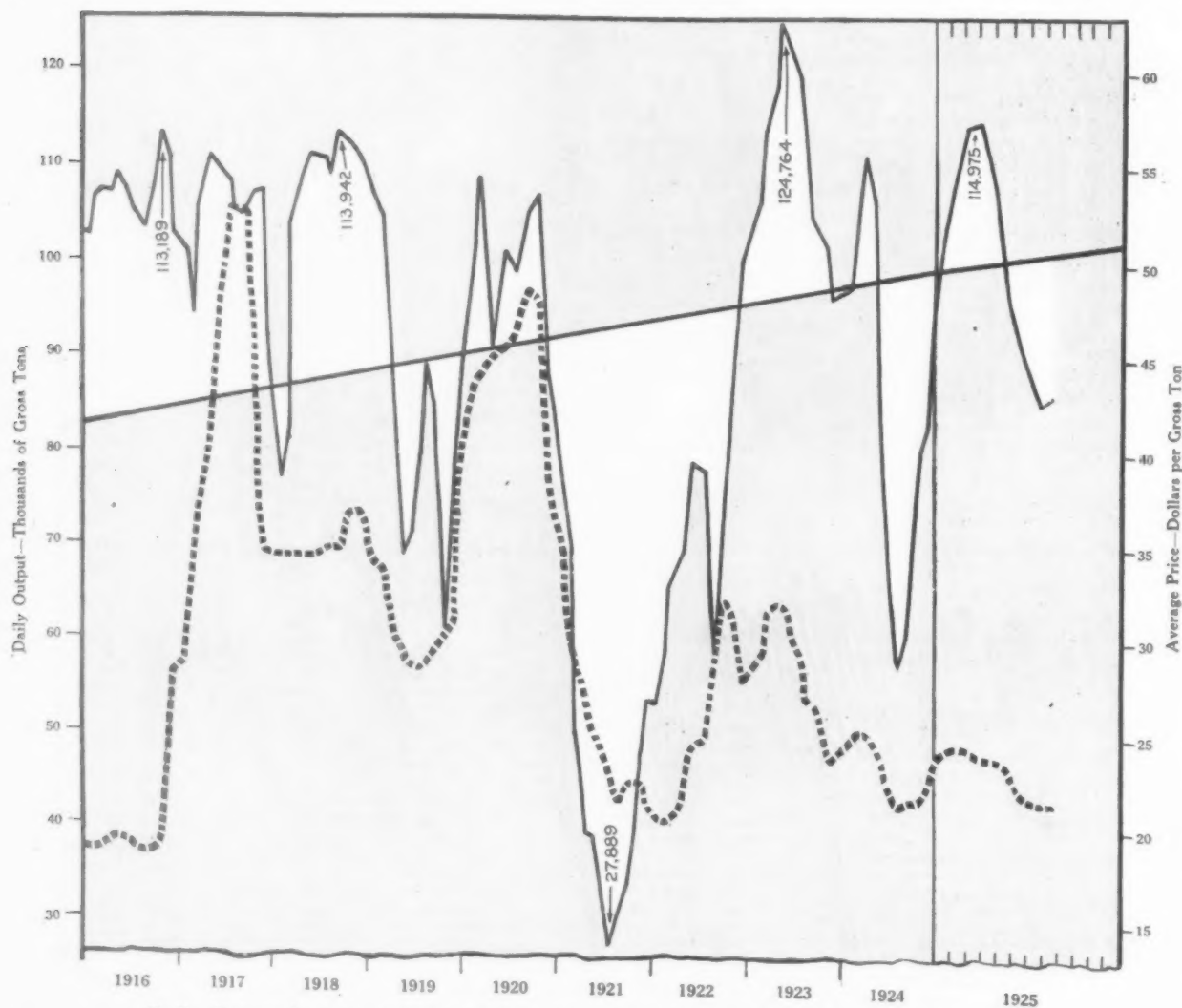
There were 9 furnaces blown in and 7 blown out or banked, a net gain of 2. This brings the number active on Sept. 1 to 192. The daily capacity of the 192 furnaces on Sept. 1 is estimated at about 87,300 tons per day as compared with 86,420 tons per day for the 190 furnaces active on Aug. 1. Of the 9 furnaces blown in 3 were Steel Corporation stacks, 5 were independent steel company units and 1 was a merchant furnace. Only 1 Steel Corporation

furnace was shut down, while 3 merchant and 3 independent steel company stacks were blown out.

Ferromanganese production in August was 18,867 tons as compared with 16,614 tons in July. The August output of spiegeleisen was 4939 tons as against 5074 tons in July.

Among the furnaces blown in during August were the following: E furnace at the Bethlehem plant of the Bethlehem Steel Corporation in the Lehigh Valley; two Duquesne furnaces of the Carnegie Steel Co. and one furnace of the Jones & Laughlin Steel Corporation in the Pittsburgh district; J furnace at the Cambria plant of the Bethlehem Steel Corporation in Western Pennsylvania; A furnace at the Sparrows Point plant of the American Steel Corporation in Maryland; No. 2 Riverside furnace of the National Tube Co. in the Wheeling district; one furnace at the Columbus works of the American Rolling Mill Co. and one furnace of the National Tube Co. in central and northern Ohio, and one furnace of the Woodward Iron Co. in Alabama.

Among the furnaces blown out or banked during August were the following: C furnace at the Lackawanna plant of the Bethlehem Steel Corporation in the Buffalo district; A furnace at the Steelton plant of the Bethlehem Steel Corporation in the lower Susquehanna Valley; Mattie furnace in the Mahoning Valley; one furnace of the National Tube Co. in northern Ohio; Ironton furnace of the Marting Iron & Steel Co. and the Belfont furnace in southern Ohio, and one furnace of the Wisconsin Steel Co. in the Chicago district.



Daily Output in August About 1.5 Per Cent More Than in July; Prices Slightly Higher

Inclined line represents the gradually increasing theoretical needs of the country, and thus shows production in recent months less than the so-called normal. Dotted line represents the average price in dollars per gross ton of No. 2 Southern at Cincinnati, No. 2 at Chicago and No. 2X at Philadelphia

Production of Coke and Anthracite Pig Iron in United States by Months, Beginning Jan. 1, 1923—Gross Tons

	1923	1924	1925
Jan.	3,229,604	3,018,890	3,370,336
Feb.	2,994,187	3,074,757	3,214,143
Mar.	3,523,868	3,466,086	3,564,247
Apr.	3,549,736	3,233,428	3,258,958
May	3,867,694	2,615,110	2,930,807
June	3,676,445	2,026,221	2,673,457
½ year ..	20,841,534	17,434,492	19,011,948
July	3,678,334	1,784,899	2,664,024
Aug.	3,449,493	1,887,145	2,704,476
Sept.	3,125,512	2,053,264	.....
Oct.	3,149,158	2,477,127	.....
Nov.	2,894,295	2,509,673	.....
Dec.	2,920,982	2,961,702	.....
Year* ..	40,059,308	31,108,302	.....

*These totals do not include charcoal pig iron. The 1924 production of this iron was 212,710 tons.

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1921—Gross Tons

	1921	1922	1923	1924	1925
Jan.	77,945	53,063	104,181	97,384	108,720
Feb.	69,187	58,214	106,935	106,026	114,791
Mar.	61,468	60,675	113,613	111,809	114,975
Apr.	39,768	69,070	118,324	107,781	108,632
May	39,394	74,409	124,764	84,358	94,542
June	35,494	78,701	122,548	67,541	89,115
½ year ..	52,089	66,578	115,147	95,794	105,039
July	27,889	77,592	118,656	57,577	85,936
Aug.	30,780	58,586	111,274	60,875	87,241
Sept.	32,850	67,791	104,184	68,442	.....
Oct.	40,215	85,092	101,586	79,907	.....
Nov.	47,183	94,990	96,476	83,656	.....
Dec.	53,196	99,577	94,225	95,539	.....
Year ..	45,325	73,645	109,713	85,075	.....

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
August, 1924	45,591	15,284	60,875
September	50,312	18,130	68,442
October	59,952	19,955	79,907
November	63,230	20,426	83,656
December	76,682	18,857	95,539
January, 1925	86,856	21,864	108,720
February	90,707	24,084	114,791
March	90,741	24,234	114,975
April	83,827	24,805	108,632
May	74,415	20,127	94,542
June	70,452	18,663	89,115
July	65,715	20,221	85,936
August	68,530	18,711	87,241

Production of Steel Companies—Gross Tons

	Total Production†		Spiegelisen and Ferromanganese*			
	1924	1925	Fe-Mn	Spiegel	Fe-Mn	Spiegel
Jan. ...	2,274,005	2,692,537	20,735	7,948	23,578	5,418
Feb. ...	2,410,658	2,539,785	22,405	9,870	18,184	4,910
Mar. ...	2,674,565	2,812,995	22,351	13,796	20,062	5,449
Apr. ...	2,463,027	2,514,828	23,580	4,240	21,448	5,341
May ...	1,927,461	2,306,887	14,993	9,336	22,679	5,294
June ...	1,507,110	2,113,566	20,049	9,405	19,836	4,972
½ year ..	13,256,826	14,980,598	124,113	54,595	125,787	31,384
July ...	1,343,952	2,037,160	14,367	15,328	16,614	5,074
Aug. ...	1,413,314	2,124,439	10,718	8,010	18,867	4,939
Sept. ...	1,509,360	.....	13,263	5,033	.....	.....
Oct. ...	1,858,502	.....	7,780	10,047	.....	.....
Nov. ...	1,896,886	.....	13,448	8,835	.....	.....
Dec. ...	2,377,141	.....	21,220	5,284	.....	.....
Year ..	23,656,981	.....	204,909	107,132	.....	.....

*Includes output of merchant furnaces.

†Ferromanganese and spiegelisen included.

Pig Iron Production by Districts, Gross Tons

	Aug. (31 days)	July (31 days)	June (30 days)	May (31 days)
New York	145,631	148,443	137,889	143,770
New Jersey .....	.....	.....	.....	.....
Lehigh Valley	73,174	66,861	63,882	70,618
Schuylkill Valley	70,662	63,803	59,789	61,427
Lower Susquehanna and Lebanon Val- leys	28,986	33,046	32,053	32,322
Pittsburgh district	513,656	471,285	482,870	582,356
Shenango Valley	90,112	90,171	87,773	88,589
Western Pa.	76,587	78,999	101,614	117,812
Maryland, Virginia and Kentucky	76,474	71,287	73,121	84,766
Wheeling district	116,728	110,029	101,738	110,328
Mahoning Valley	277,738	285,278	274,452	287,521
Central and North- ern Ohio	339,622	311,563	309,332	322,959
Southern Ohio	32,841	45,043	43,208	47,450
Illinois and Indiana	508,022	520,666	543,622	595,273
Mich., Minn., Mo., Wis., Colo. and Utah	119,891	137,871	127,631	138,073
Alabama	228,642	224,837	229,453	241,611
Tennessee	5,710	4,842	5,030	5,932
Total	2,704,476	2,664,024	2,673,457	2,930,807

STEEL MAKING CAPACITY

A Recheck Advocated to Eliminate What Is Practically Obsolete

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"I am heartily in accord with the views expressed by John A. Topping, chairman of the Republic Iron & Steel Co., in his article published in THE IRON AGE of Aug. 6. I think the present stated capacity of 58,000,000 tons is materially out of line with the real tonnage that can be produced. Under pressure, I doubt if the country today could produce more than Chairman Topping's estimate of 51,000,000 tons. A great many of the units producing under war pressure of 1917, when a maximum of 45,060,000 tons was produced, were temporary, some of these units not now existing and a number being obsolete for all practical purposes. There is a considerable capacity rated that is entirely obsolete, some of which will never again produce steel.

"I believe a careful recheck of the capacities would be helpful to the industry and would keep more properly informed both the producer and the consumer."

Scarcity of Work Reported from Pennsylvania Centers

HARRISBURG, PA., Aug. 24.—Conditions in the iron and steel trade of Pennsylvania, if anything, were poorer during the first half of August than during the preceding periods, judging from reports on labor conditions to R. H. Lansburgh, Secretary of Labor and Industry.

Pittsburgh reports a reduction in openings for workmen. There is a surplus of men for all types of work, but the reporter seems inclined to be "hopeful for the immediate future." Reading, which has experienced no improvement, finds several departments of the Reading Iron Co. closed, owing to lack of orders, although the condition is thought to be only temporary. Harrisburg likewise has experienced a slackening of activity. One large plant has closed a furnace, while another firm has shut down its rolling mills. Others have curtailed operations.

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Change in Trumbull Steel Management

Merger with Otis Steel Co. Halted While Affairs of Trumbull Company Are Investigated — President Warner Succeeded Temporarily by Philip Wick — James A. Campbell on Trumbull Board

CLEVELAND, Sept. 1.—Dissatisfaction with the plans for the merger of the Trumbull and Otis steel companies led today to the resignation of Jonathan Warner as president and director of the Trumbull company and the appointment of an executive committee of three members headed by James A. Campbell, president Youngstown Sheet & Tube Co., to have full charge of the plant when the directors are not in session. Mr. Campbell was also elected a director to succeed Mr. Warner.

Vigorous opposition to the terms of the merger developed yesterday among the preferred stockholders of the Trumbull company in Youngstown, who objected to the clause in the proposed terms of merger providing for the exchange of old preferred stock for the new, an arrangement which was claimed to place them on the same basis as the holders of Otis preferred stock. This has paid no dividends for over three years.

The various complaints resulted in an offer by Mr. Campbell to head a special committee to take over the management of the Trumbull company. A meeting of the Trumbull directors, which was scheduled to be held in Warren this morning, was shifted to Cleveland and took place at the offices of the Cleveland-Cliffs Iron Co. President Warner did not attend, but Mr. Campbell was present by invitation. After the conclusion of the meeting the following statement was given out this evening:

Statement of Trumbull Board of Directors

"At a meeting of the board of directors of the Trumbull Steel Co., held at Cleveland today, the following action was taken: The resignation of Jonathan Warner as president and director of the company was accepted. Philip Wick, Youngstown, a vice-president, was elected president temporarily to fill the vacancy caused by Mr. Warner's resignation. The vacancy in the board created by the resignation of Mr. Warner was filled by the election of James A. Campbell, president Youngstown Sheet & Tube Co., to the board. In the opinion of the board it seemed desirable that its creditor banks be represented on the board. William M. McFate, a director of the company, tendered his resignation, which was accepted; whereupon A. E. Adams, president First National Bank, Youngstown, was elected to the board to fill the vacancy caused by the resignation of Mr. McFate. Mr. McFate continues as a vice-president.

"The board decided to create an executive committee of three members, to have full charge of the plant, property and business of the company during such time as the board of directors was not in session. This executive committee was filled by the election of James A. Campbell, Philip Wick and A. E. Adams.

"In view of the fact that the audit of the company, now being made, has developed that there are certain material errors in the representations made by the Trumbull Steel Co. to the National City Co., we have agreed with the National City Co. to withdraw from sale the \$17,500,000 aggregate principal amount of debentures of the Trumbull Steel Co. which they had contracted to sell for the Trumbull Steel Co. under an agreement dated July 25. In view of the ascertainment of the errors in these representations, the board has arranged for a completion of the audit of the company in order that the exact position of the company as regards its assets, liabilities and earnings be available at the earliest possible moment. As soon as this audit and investigation are completed the stockholders of the company will be immediately ad-

vised of the result. In the meantime, everything possible will be done to fully safeguard the interests of the stockholders.

"The entire situation affecting the company, so far as the board of directors know it, has been fully stated to our banking creditors, and it is due to them to say that their attitude is most friendly and that we are assured of their most helpful cooperation. Pending the ascertainment of the exact situation of the company, as affects its assets, liabilities and earnings, obviously no action can be taken toward a merger, consolidation or sale, as it is necessary, before the board or the stockholders could act intelligently with regard to any such development, that they have before them a complete and accurate statement of the condition of the company.

"It is the opinion of the board of directors, based upon information at hand, that the condition of the Trumbull Steel Co. is fundamentally sound; that is, its plant, property and assets are sufficient in value to pay off all its debts, pay off its preferred stock at par, and leave a substantial equity for its common stock."

What Is Involved in Proposed Merger

In the negotiations for the merger of the Trumbull Steel Co., Warren, Ohio, and the Otis Steel Co. and Midland Steel Products Co., Cleveland, Cleveland and New York financial interests have appeared to be taking the most conspicuous part. In the face of reports of dissatisfaction on the part of some of the Trumbull stockholders, it is stated that a majority of the common stock of that company, as well as of the Otis company, is controlled by the interests which are working for the consolidation. E. J. Kulas, president of the Otis Steel Co. and of the Midland Steel Products Co., is scheduled to be president of the combined company. The Midland Steel Products Co., with plants in Cleveland and Detroit, is a large manufacturer of automobile frames, considerable of its product going to the Ford Motor Co. For a long time it has purchased the bulk of its steel from the Otis company.

The combined assets of the three companies are in excess of \$100,000,000. It is announced that the capital structure of the merged company, if the plans are carried out, will consist of \$30,000,000 in 6 per cent bonds, \$33,000,000 in 7 per cent cumulative preferred stock and 1,760,000 shares of no par common stock. The terms, which may be modified in some particulars, provide for an exchange of shares on the following basis:

One share of Otis Steel common for 1 share of new common.

One share of Otis Steel preferred for 1½ shares of new preferred, the exchange taking into account accumulated dividends of \$29 a share.

One share of Trumbull Steel common for 1 share of new common.

One share of Trumbull Steel preferred for 1 share of new preferred.

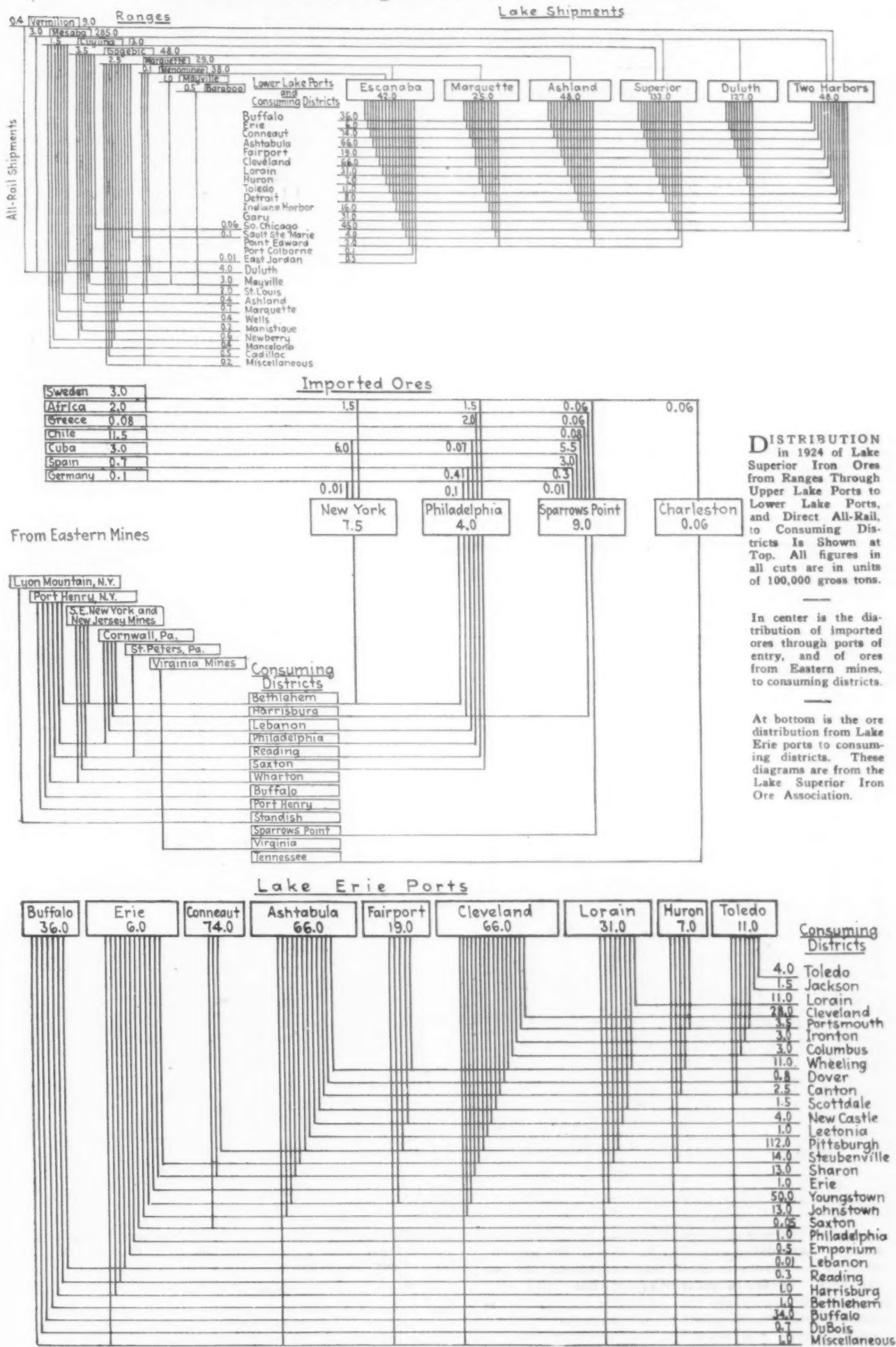
One share of Midland Steel Products common for 4 shares of new common.

One share of Midland Steel participating preferred for 1½ shares of new preferred, 2 shares of new common and \$10 a share in cash or new 6 per cent bonds.

The plans also provide for a bond issue of \$12,500,000 to be used to retire \$4,375,000 in 8 per cent bonds and \$4,600,000 in 7½ per cent bonds of the Otis Steel Co., to provide \$10 a share in cash or bonds for

(Concluded on page 647)

Where Lake Superior Ore Went in 1924



AUGUST IRON OUTPUT

Net Gain of 2 Furnaces—9 Blown In and 7 Shut Down

Daily Rate 1305 Tons Larger Than July, a Gain of 1.5 Per Cent

For the first time since last March pig iron output in August made an increase over the previous month. According to data collected largely by wire and with the production for Aug. 31 estimated by most of the companies, the daily rate in August was 1305 gross tons higher than in July, an increase of 1.5 per cent.

The production of coke pig iron for the 31 days in August amounted to 2,704,476 tons or 87,241 tons per day, as compared with 2,664,024 tons or 85,936 tons per day for the 31 days in July. A year ago, or in August, 1924, the daily rate was only 60,875 tons per day.

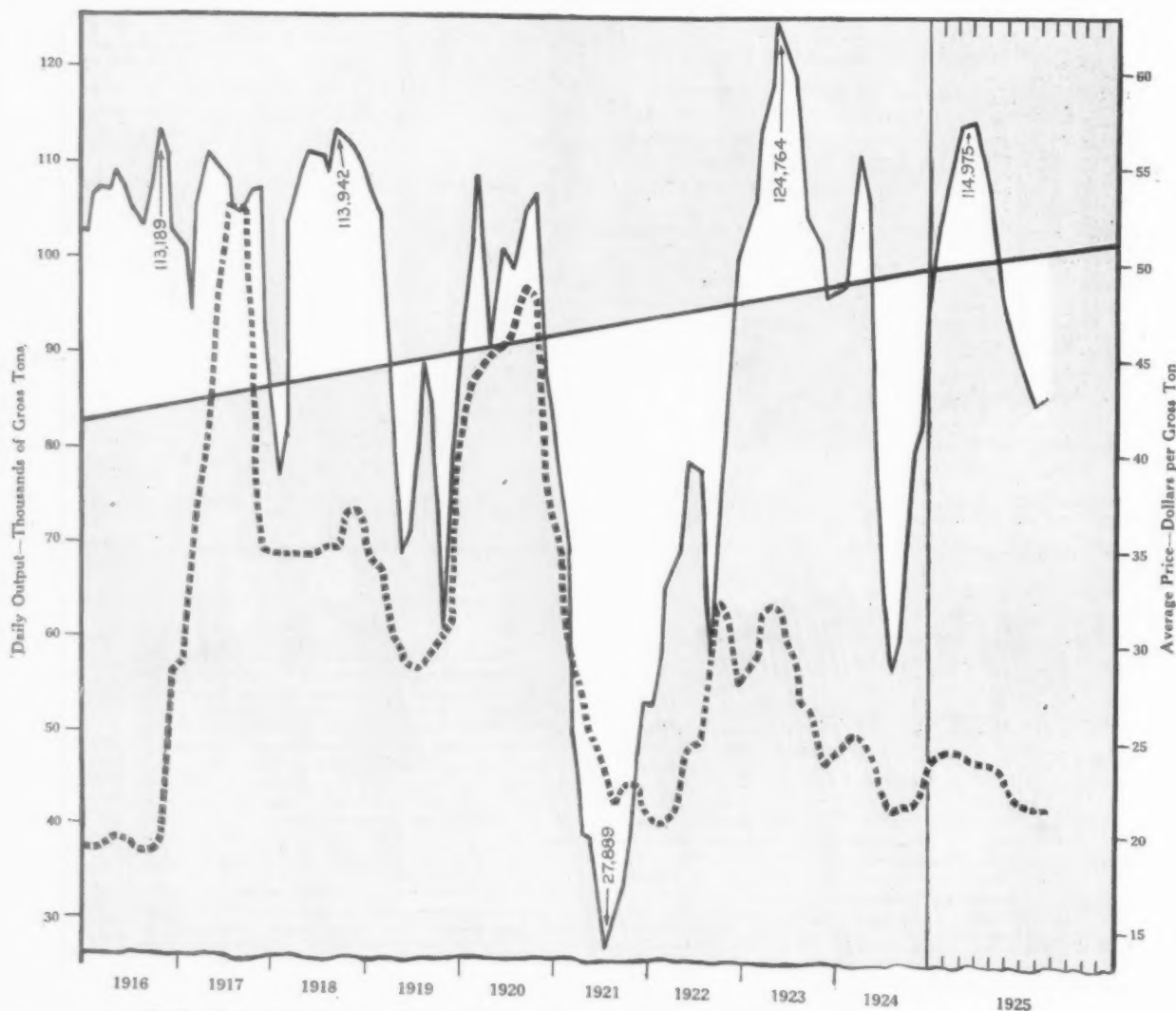
There were 9 furnaces blown in and 7 blown out or banked, a net gain of 2. This brings the number active on Sept. 1 to 192. The daily capacity of the 192 furnaces on Sept. 1 is estimated at about 87,300 tons per day as compared with 86,420 tons per day for the 190 furnaces active on Aug. 1. Of the 9 furnaces blown in 3 were Steel Corporation stacks, 5 were independent steel company units and 1 was a merchant furnace. Only 1 Steel Corporation

furnace was shut down, while 3 merchant and 3 independent steel company stacks were blown out.

Ferromanganese production in August was 18,867 tons as compared with 16,614 tons in July. The August output of spiegeleisen was 4939 tons as against 5074 tons in July.

Among the furnaces blown in during August were the following: E furnace at the Bethlehem plant of the Bethlehem Steel Corporation in the Lehigh Valley; two Duquesne furnaces of the Carnegie Steel Co. and one furnace of the Jones & Laughlin Steel Corporation in the Pittsburgh district; J furnace at the Cambria plant of the Bethlehem Steel Corporation in Western Pennsylvania; A furnace at the Sparrows Point plant of the Bethlehem Steel Corporation in Maryland; No. 2 Riverside furnace of the National Tube Co. in the Wheeling district; one furnace at the Columbus works of the American Rolling Mill Co. and one furnace of the National Tube Co. in central and northern Ohio, and one furnace of the Woodward Iron Co. in Alabama.

Among the furnaces blown out or banked during August were the following: C furnace at the Lackawanna plant of the Bethlehem Steel Corporation in the Buffalo district; A furnace at the Steelton plant of the Bethlehem Steel Corporation in the lower Susquehanna Valley; Mattie furnace in the Mahoning Valley; one furnace of the National Tube Co. in northern Ohio; Iron-ton furnace of the Marting Iron & Steel Co. and the Belfont furnace in southern Ohio, and one furnace of the Wisconsin Steel Co. in the Chicago district.



Daily Output in August About 1.5 Per Cent More Than in July; Prices Slightly Higher

Inclined line represents the gradually increasing theoretical needs of the country, and thus shows production in recent months less than the so-called normal. Dotted line represents the average price in dollars per gross ton of No. 2 Southern at Cincinnati, No. 2 at Chicago and No. 2X at Philadelphia

Production of Coke and Anthracite Pig Iron in United States by Months, Beginning Jan. 1, 1923—Gross Tons

	1923	1924	1925
Jan.	3,229,604	3,018,890	3,370,336
Feb.	2,994,187	3,074,757	3,214,143
Mar.	3,523,868	3,466,086	3,564,247
Apr.	3,549,736	3,233,428	3,258,958
May	3,867,694	2,615,110	2,930,807
June	3,676,445	2,026,221	2,673,457
½ year ..	20,841,534	17,434,492	19,011,948
July	3,678,334	1,784,899	2,664,024
Aug.	3,449,493	1,887,145	2,704,476
Sept.	3,125,512	2,053,264	.....
Oct.	3,149,158	2,477,127	.....
Nov.	2,894,295	2,509,673	.....
Dec.	2,920,982	2,961,702	.....
Year*	40,059,308	31,108,302	.....

*These totals do not include charcoal pig iron. The 1924 production of this iron was 212,710 tons.

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1921—Gross Tons

	1921	1922	1923	1924	1925
Jan.	77,945	53,063	104,181	97,384	108,720
Feb.	69,187	58,214	106,935	106,026	114,791
Mar.	51,468	63,675	113,673	111,809	114,975
Apr.	39,768	69,070	118,324	107,781	108,632
May	39,394	74,409	124,764	84,358	94,542
June	35,494	78,701	122,548	67,541	89,115
½ year ..	52,089	66,578	115,147	95,794	105,039
July	27,889	77,592	118,656	57,577	85,936
Aug.	30,780	58,586	111,274	60,875	87,241
Sept.	32,850	67,791	104,184	68,442	.....
Oct.	40,215	85,092	101,586	79,907	.....
Nov.	47,183	94,990	96,476	83,656	.....
Dec.	53,196	99,577	94,225	95,539	.....
Year	45,325	73,645	109,713	85,075	.....

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
August, 1924	45,591	15,284	60,875
September	50,312	18,130	68,442
October	59,952	19,955	79,907
November	63,230	20,426	83,656
December	76,682	18,857	95,539
January, 1925	86,853	21,864	108,720
February	90,707	24,084	114,791
March	90,741	24,234	114,975
April	83,827	24,805	108,632
May	74,415	20,127	94,542
June	70,452	18,663	89,115
July	65,715	20,221	85,936
August	68,530	18,711	87,241

Production of Steel Companies—Gross Tons
Spiegeleisen and Ferromanganese*

	Total Production†	1924	1925	Fe-Mn	Spiegel	Fe-Mn	Spiegel
Jan. ...	2,274,005	2,692,537	20,735	7,948	23,578	5,418	.....
Feb. ...	2,410,658	2,539,785	22,405	9,870	18,184	4,910	.....
Mar. ...	2,674,565	2,812,995	22,351	13,796	20,062	5,449	.....
Apr. ...	2,463,027	2,514,828	23,580	4,240	21,448	5,341	.....
May ...	1,927,461	2,306,887	14,993	9,336	22,679	5,294	.....
June ...	1,507,110	2,113,566	20,049	9,405	19,836	4,972	.....
½ year ..	13,256,826	14,980,598	124,113	54,595	125,787	31,384	.....
July ...	1,343,952	2,037,160	14,367	15,328	16,614	5,074	.....
Aug. ...	1,413,314	2,124,439	10,718	8,010	18,867	4,939	.....
Sept. ...	1,509,360	.....	13,263	5,033	.....	.....	.....
Oct. ...	1,858,502	.....	7,780	10,047	.....	.....	.....
Nov. ...	1,896,886	.....	13,448	8,835	.....	.....	.....
Dec. ...	2,377,141	.....	21,220	5,284	.....	.....	.....
Year ..	23,656,981	.....	204,909	107,132	.....	.....	.....

*Includes output of merchant furnaces.

†Ferromanganese and spiegeleisen included.

Pig Iron Production by Districts, Gross Tons

	Aug. (31 days)	July (31 days)	June (30 days)	May (31 days)
New York	145,631	148,443	137,889	143,770
New Jersey .....	.....	.....	.....	.....
Lehigh Valley	73,174	66,861	63,882	70,618
Schuylkill Valley ..	70,662	63,803	59,789	61,427
Lower Susquehanna and Lebanon Val- leys	28,986	33,046	32,053	32,322
Pittsburgh district ..	513,656	471,285	482,870	582,356
Shenango Valley	90,112	90,171	87,773	88,589
Western Pa.	76,587	78,999	101,614	117,812
Maryland, Virginia and Kentucky	76,474	71,287	73,121	84,766
Wheeling district	116,728	110,029	101,738	110,328
Mahoning Valley	277,738	285,278	274,452	287,521
Central and North- ern Ohio	339,622	311,563	309,332	322,959
Southern Ohio	32,841	45,043	43,208	47,450
Illinois and Indiana ..	508,022	520,666	543,622	595,273
Mich., Minn., Mo., Wis., Colo. and Utah	119,891	137,871	127,631	138,073
Alabama	228,642	224,837	229,453	241,611
Tennessee	5,710	4,842	5,030	5,932
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Iron and Steel Markets

GAIN IN AUGUST ORDERS

Upturn in Pig Iron Production After Four Months' Decline

Steel Works Operations Greater and Bar Business Grows—Coke Is Higher

August orders booked by steel mills quite generally exceeded those for July, reports from important companies showing increases ranging from 10 to 25 per cent. In operations the past week again shows a slight increase, the percentage of the Steel Corporation being now estimated at 75 and that of independent companies at 70.

August pig iron statistics, gathered by wire on Sept. 1, show the expected upturn after four months of decline from the year's peak in March. At 2,704,476 tons, last month's pig iron production averaged 87,241 tons a day, as against a total of 2,664,024 tons for July, or 85,936 tons a day.

The steel company blast furnaces increased their output by about 2800 tons a day in August, while the merchant furnaces, nearly all of which produce foundry iron, showed a decrease of 1500 tons a day. Thus the net gain upon July was about 1300 tons a day, or 1.5 per cent.

Furnaces in blast on Sept. 1 numbered 192, a gain of 2 in the month. Estimated active capacity on Sept. 1 was 87,300 tons a day, as against 86,420 tons a day for 190 furnaces on Aug. 1. Nine furnaces were blown in last month and seven were blown out.

The steel ingot statistics for August, to appear next week, are expected to show a greater increase over July than that in pig iron. The common prediction is that the Steel Corporation's statement of next week will show a considerably smaller reduction in unfilled orders than the 170,000 tons of July.

In finished steel, increased bookings of steel bars are given more prominence in both Pittsburgh and Chicago reports. The largest Pittsburgh producer has more bar orders ahead than in some months, and at Chicago the period of possible delivery is extending. In the three heavy products—plates, shapes and bars—Chicago mills have had the largest week's business since July.

Activity in these three products offsets lighter specifications in tin plate and some falling off in new pipe tonnage. Reduced prices for gasoline have caused the laying aside, for a time at least, of several pipe line projects.

Farm equipment works are busier, operations running up to 75 and 80 per cent. September bar requirements of automobile plants also are heavy.

The extent of railroad buying this fall is the outstanding market uncertainty. Chicago reports of the week that several thousand cars are about to be placed are unconfirmed. With the C & O inquiry for 50 locomotives, 145 are pending. The Texas & Pacific is in the market for 14,000 tons of 90-lb. rails and an Ohio road's inquiry is for 2500 to 4000 tons.

Included in 27,000 tons of structural steel work

contracted for in the past week was 12,000 tons for subway work in Philadelphia, while the largest new project up for bids is 5700 tons for subway work in New York.

Because of the 85,000 tons of plates involved, the taking of the first bids on Sept. 4 for the Moke-lumne River project at Oakland, Cal., following the court decision validating a \$39,000,000 bond issue, has attracted attention widely.

Buying by the American Radiator Co., estimated at more than 40,000 tons, is the chief feature in pig iron, though in this case it follows considerable contracting by other large interests, instead of starting a buying movement as on some other occasions. Pig iron prices give indications of firmness in some quarters, but this is not definitely connected with the anthracite strike.

At Pittsburgh coke producers are asking higher prices, in view of the sale of considerable amounts for domestic purposes. One factor is the possibility of higher wages at independent Connellsville coke plants in case the demand brings into operation much of the idle capacity.

The eastern Pennsylvania scrap market is stronger, with transactions in melting steel at \$17 and \$17.50. In the Pittsburgh district there has been further buying at \$19, with the supply rather more plentiful. One steel company there bought pig iron because it was as cheap as heavy melting steel. A Chicago steel maker closed for 20,000 tons at \$17.

The Nippon Oil Co. divided 44,000 boxes of tin plates between Welsh mills and the Steel Corporation, the American price being less than \$4.50 per base box. Welsh tin plate works are running at about 50 per cent of capacity.

Pig iron, as measured by THE IRON AGE composite price, has advanced to \$19.13 from \$19.04 last week. One year ago it was \$19.46.

Finished steel is unchanged at 2.396c. per lb., according to THE IRON AGE composite price. One year ago it was 2.510c.

Pittsburgh

Notable Buying of Steel—Increasing Production of Pig Iron

PITTSBURGH, Sept. 1.—If there is any complaint about the steel business, it is on the score of prices, rather than of the volume of bookings. With most companies and in almost all steel products, last month was the best August in volume of business that the manufacturers in the Pittsburgh and nearby districts have had in several years.

August business in pipe failed to equal that of July, but there is no dispute that August was a good one when the comparison is made with a series of years. The leading maker of steel bars has a heavy order book, as is indicated by the fact that it is no longer promising quick delivery of any size. In some sizes delivery promises are running as far as four weeks. This, of course, is helpful to the independent producers, and there is a really good demand for bars because of the activity of the agricultural implement

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 1, 1925	Aug. 25, 1925	Aug. 4, 1925	Sept. 2, 1924
No. 2X, Philadelphia...	\$21.76	\$21.76	\$21.26	\$21.76
No. 2, Valley furnace...	18.50	18.50	18.50	20.00
No. 2, Southern, Cin'ti...	22.55	22.55	22.55	21.55
No. 2, Birmingham, Ala...	18.50	18.00	18.00	17.50
No. 2 foundry, Ch'go furn...	20.50	20.50	20.50	20.50
Basic, del'd, eastern Pa...	20.50	20.50	20.50	20.00
Basic, Valley furnace...	18.00	18.00	18.00	19.00
Valley Bessemer del'd P'gh	20.76	20.76	20.76	21.76
Malleable, Chicago furn...	20.50	20.50	20.50	20.50
Malleable, Valley...	18.50	18.50	18.50	20.00
Gray forge, Pittsburgh...	19.76	19.76	19.76	21.26
L. S. charcoal, Chicago...	29.04	29.04	29.04	29.04
Ferromanganese, furnace...	115.00	115.00	115.00	95.00

Sheets, Nails and Wire,	Sept. 1, 1925	Aug. 25, 1925	Aug. 4, 1925	Sept. 2, 1924
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.15	3.15	3.15	3.50
Sheets, black, No. 28, Chi-				
cago dist. mill.	3.30	3.30	3.30	...
Sheets, galv., No. 28, P'gh	4.20	4.20	4.20	4.60
Sheets, galv., No. 28, Chi-				
cago dist. mill.	4.35	4.35	4.30	...
Sheets, blue, 9 & 10, P'gh	2.25	2.30	2.30	2.65
Sheets, blue, 9 & 10, Chi-				
cago dist. mill.	2.40	2.40	2.40	...
Wire nails, Pittsburgh...	2.65	2.65	2.65	2.80
Wire nails, Chicago dist.				
mill	2.70	2.70	2.70	...
Plain wire, Pittsburgh...	2.50	2.50	2.50	2.55
Plain wire, Chicago dist.				
mill	2.55	2.55	2.55	...
Barbed wire, galv., P'gh...	3.35	3.35	3.35	3.50
Barbed wire, galv., Chi-				
cago dist. mill.	3.40	3.40	3.40	...
Tin plate, 100 lb. box, P'gh	\$5.50	\$5.50	\$5.50	\$5.50

Rails, Billets, etc., Per Gross Ton:	Sept. 1, 1925	Aug. 25, 1925	Aug. 4, 1925	Sept. 2, 1924
O.-h. rails, heavy, at mill.	\$43.00	\$43.00	\$43.00	\$43.00
Bess. billets, Pittsburgh...	35.00	35.00	35.00	37.00
O.-h. billets, Pittsburgh...	35.00	35.00	35.00	37.00
O.-h. sheet bars, P'gh...	35.00	35.00	35.00	37.50
Forging billets, base, P'gh	40.00	40.00	40.00	42.00
O.-h. billets, Phila...	40.30	40.30	40.30	42.17
Wire rods, Pittsburgh...	45.00	45.00	45.00	46.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb...	1.90	1.90	1.90	2.00
Light rails at mill.	1.60	1.60	1.60	1.85

Finished Iron and Steel,	Sept. 1, 1925	Aug. 25, 1925	Aug. 4, 1925	Sept. 2, 1924
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.12	2.12	2.17	2.32
Iron bars, Chicago...	1.90	1.90	1.90	2.15
Steel bars, Pittsburgh...	1.90	1.90	2.00	2.10
Steel bars, Chicago...	2.10	2.10	2.10	2.10
Steel bars, New York...	2.24	2.24	2.34	2.44
Tank plates, Pittsburgh...	1.80	1.80	1.90	1.90
Tank plates, Chicago...	2.10	2.10	2.10	2.10
Tank plates, New York...	2.14	2.14	2.14	2.09
Beams, Pittsburgh...	1.90	1.90	2.00	2.00
Beams, Chicago...	2.10	2.10	2.10	2.10
Beams, New York...	2.24	2.24	2.24	2.34
Steel hoops, Pittsburgh...	2.40	2.40	2.40	2.60

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

THE IRON AGE Composite Prices

Sept. 1, 1925, Finished Steel, 2.396c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 88 per cent of the United States output of finished steel.	One week ago, 2.396c. One month ago, 2.439c. One year ago, 2.510c. 10-year pre-war average, 1.689c.
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Sept. 1, 1925, Pig Iron, \$19.13 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.	One week ago, \$19.04 One month ago, 18.96 One year ago, 19.46 10-year pre-war average, 15.72
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Sept. 1, 1925, Steel Scrap, \$17.58 Per Gross Ton

Based on average of heavy melting steel at Chicago, Pittsburgh and Philadelphia.	One week ago, \$17.42 One month ago, 16.92 One year ago, 16.83 10-year pre-war average, 14.09
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High				Low			
1923	1924	1925		1925	1924	1923	
2.824c., April 24	2.789c., Jan. 15	2.560c., Jan. 6	Finished Steel	2.396c., Aug. 18	2.460c., Oct. 14	2.446c., Jan. 2	
\$30.86, March 20	\$22.88, Feb. 26	\$22.50, Jan. 13	Pig Iron	\$18.96, July 7	\$19.21, Nov. 3	\$20.77, Nov. 20	
25.50, March 20	20.92, Dec. 30	20.83, Jan. 18	Steel Scrap	15.08, May 5	14.50, April 22	14.50, Oct. 30	

and automobile industries. Continued improvement has marked the past week in wire products orders, and the gain in this direction partly offsets lighter specifications in tin plate and a slight loss in new pipe tonnage.

As has been the case for several months, or since railroad car buying ceased, plates continue to show up poorest in point of sales. Structural material is making a good showing, although the demand is greater from outside than within the Pittsburgh area.

There is no occasion to change steel prices materially from those of a week ago. Sheet makers are finding some difficulty in establishing the advance an-

nounced a few weeks ago to 4.30c., base, Pittsburgh, for galvanized sheets, chiefly because of competition from material sold to jobbers when the mills were accumulating backlogs prior to the advance of early July. Purchases made then show buyers a good profit at \$1 or \$2 a ton below the price now sought by the mills. Plate mill competition with blue annealed sheets is greater than it has been and made difficult the maintenance of 2.30c., base, Pittsburgh, as the ruling figure on that grade. The ruling price on black sheets is 3.15c., base, Pittsburgh, but really desirable tonnages are going \$1 a ton less.

Steel plant operations show no special change in the general average as compared with a week ago. The Carnegie Steel Co. is producing ingots at about 70 per cent of capacity, and the average of independent companies is at about the same rate. There was a net gain of four furnaces in this and nearby districts in August. Carnegie Steel Co. and the Jones & Laughlin Steel Corporation each started two furnaces and the Bethlehem Steel Co. one at Johnstown, while the furnace of the A. M. Byers Co. at Girard, Ohio, was blown out. There are now 72 out of 135 furnaces in production.

The coke market has taken a substantial price brace since a week ago, with sales of spot furnace grade noted at \$3.75 per net ton at ovens, while \$3.40 appears to be as low as any recent business has been done. It appears that orders for coke for domestic use have been much larger than had been generally supposed, and coke producers also have been influenced in their price ideas by fears that enlarged operations would be followed by demands by the men for higher wages. The independent producers in the Connellsville district are paying a scale roughly about one-third less than that of the H. C. Frick Coke Co., and as the latter has been putting on ovens in large numbers in the past few weeks, a good many men have left the independent operations to seek work at the Frick plants. That company cannot provide work for all the men that are available, but it is no secret that the existence of two wage scales is a matter of concern to the independent operators.

The appreciation in coke prices as yet has found no reflection in pig iron prices chiefly because demand is light, but also because producers are dubious that higher prices based on higher coke costs could be obtained. Scrap supplies appear to be slightly more plentiful, and the market is not helped by the fact that one steel maker in the past week bought pig iron because it was as cheap as heavy melting steel scrap.

Pig Iron.—The market here is fairly firm but not very active. Steel makers who buy their pig iron are showing very little interest in basic pig iron and the only business of consequence recently done was a purchase of between 5000 and 10,000 tons of that grade by an Ohio Valley steel maker from a neighboring steel company at a delivered price of about \$19. The buyer is a producer of iron but because of the high price of scrap in relation to pig iron took this tonnage of pig iron instead of scrap for stock. The Valley furnace market on this grade remains at \$18. Only small sales of Bessemer iron are noted and these have been at \$19, Valley furnace. Inquiries for foundry iron are somewhat more numerous than they were recently, but the actual turnover still is small, both in the individual sales and the total. The ruling price still is \$18.50 for No. 2 foundry, but \$19 is wanted on fourth-quarter tonnages and that price also has been named for first quarter iron. W. P. Snyder & Co. make the average price for August of Bessemer iron to be \$19 and of basic \$18, the same prices as for July and June.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.76 per gross ton:

Basic	\$18.00
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	18.50
Low phosphorus, copper free....	\$27.75 to 28.00

Ferroalloys.—This market does not show much snap, but prices are steady, chiefly because producing costs or other considerations are preventing much pressure to sell. In contrast with some other markets, the demand for ferromanganese here is for small tonnages for early delivery, consumers being interested only in the maintenance of stocks. The market still is quoted at \$115, Atlantic seaboard on both domestic and foreign material, but the reason seems to be in the inability of British producers to sell the material for less and make a profit and British prices govern those of domestic and other foreign material. English exchange is at least 10 per cent higher than it was when British producers sold ferromanganese at \$95, duty paid, and it is said that even though low-priced ore was used, they

suffered a loss at that price. The Steel Corporation which is an occasional seller of ferromanganese sells f.o.b. Pittsburgh, this basis making a slightly lower delivered price than from the seaboard. On some recent business in St. Louis there are counterclaims as to the price. The seller says it was \$115 Atlantic seaboard or the equivalent, while those who failed to get any of the four orders recently placed there say that buyers claimed a lower price. New business in spiegeleisen and 50 per cent ferrosilicon is light but there is a fair movement against contracts. Prices are given on page 649.

Semi-Finished Steel.—There is so little open market activity in billets, slabs and sheet bars in this district that actual prices are not easily determined. Mills here shipping to regular customers on contracts report the market as \$35, Pittsburgh, on all three forms and consumers in this area of billets and slabs say that is the lowest price they have been able to obtain on steel rolled to specification. Mills outside the Pittsburgh district proper, seem to be working toward an f.o.b. mill basis of quotation and quotations on this basis usually figure out less than the equivalent of \$35, Pittsburgh. The ordinary tonnage price on wire rods remains at \$45 base, Pittsburgh and Cleveland, and \$46 Chicago. Specifications against contracts are heavier than they were a month or so ago and there is a steady demand for small lots. On skelp, 1.90c. is easily done. Prices are given on page 649.

Wire Products.—Makers here still are doing a very satisfactory business, although neither jobbers nor manufacturing consumers yet show a pronounced inclination to buy beyond their known requirements. In other words, there is no stocking and the gain in orders is a close reflex of the fact that consumption is good and that distributors and manufacturers lack sufficient stocks to take care of it without recourse to the mills. Everything ordered is wanted promptly and probably as promptly is moving into consumption. With no additions being made to stocks in second hands, the mills are counting strongly on a stocking movement this fall. Mill operations are somewhat above 60 per cent on the average. Prices are steady. They are given on page 648.

Rails and Track Supplies.—The better prospect for soft coal mine operation through the suspension of the hard coal mines has found some reflection in the demand for light rails, but it has not yet developed proportions that enable the makers to get materially better prices. There are a good many makers, counting in those who roll from rails, and a good deal of competition for every order that is presented. The Pennsylvania Railroad is expected to buy some spikes and tie plates next month for shipment over the last quarter of the year, but generally, the market for track accessories is quiet so far as new business is concerned. Specifications against old orders are fairly good. Quotations given on page 648 are subject to some shading.

Tubular Goods.—Fall building activities are bringing in a good many rush shipment orders for standard pipe, but in a general way, the pipe market is not quite so active as it was recently. The continued decline in oil prices is having some influence on drilling plans and in turn on the demand for oil country pipe. There is commonly some falling away in this business in the fall, but it has come earlier than usual this year, because of the overproduction in California, the reflection of which is found in large offerings of California gasoline along the Atlantic seaboard. The mills still are well engaged on old line pipe orders and there is a constant flow of small orders. We now estimate pipe mill capacity in this and nearby districts to be producing about 85 per cent, as against about 90 per cent a month ago. Boiler tubes present an unsatisfactory situation in that there are too many sellers for buyers and much price competition. Discounts are given on page 648.

Sheets.—From the angle of business, the situation is fairly satisfactory, but prices still leave something to be desired. Generally, Pittsburgh district mills and those quoting on a Pittsburgh base, are at 3.15c., base for black, 2.30c., base for blue annealed and 4.30c., base for galvanized, but only in the case of black sheets are these prices representative of the bulk of the passing

sales. Plate mill competition with blue annealed sheets is strong and 2.25c., base, is the more common sales base. A few sales of galvanized sheets are reported at the full quotations, but makers sold a good bit of tonnage prior to the advance early in July to 4.20c. and these sheets now are being offered in competition with mill offerings and make hard the effort to get up the price. On really attractive tonnages of black sheets 3.10c. is being done. There seems to be good observance of 4.25c., base (No. 22-gage) on automobile body sheets, demand for which is holding up well, due to the fact that motor car builders are making larger sales than they expected or had prepared for in raw materials purchases. Prices are given on page 648.

Tin Plate.—Mills in this district still are busy, but specifications are lighter with some makers than they have been and it looks as if the packers' requirements had been largely supplied. Makers can see a good production through September, but some decrease thereafter. There is nothing new as to prices.

Cold Finished Steel Bars and Shafting.—The leading maker of ground shafting has announced effective from Aug. 26, a carload base, f.o.b. mill, of 2.80c. for 4 7-16 in. to 7 in. inclusive, 2.90c., for 1 15-16 in. to 4% in., inclusive, and of 3c. for 1 3-16 in. to 1% in. inclusive, these prices subject to the card of extras dated March 10, 1924. This change represents a decline of \$1 to \$2 a ton in the larger sizes, but no change in the smaller sizes. Screw stock bars still are in good demand and August is called the best August in the history of the industry in point of volume. There is not the same satisfaction over prices. The ordinary tonnage price remains at 2.50c., base, Pittsburgh.

Hot-Rolled Flats.—Demand keeps up well in volume, although buyers are not anticipating their requirements and it is because consumption is good that they have to buy so frequently. Prices are steady. It is said there is a slight margin of profit on the right side in the narrow material, but a loss on wide stock for those who buy instead of make their steel. Prices are given on page 648.

Cold-Rolled Strips.—August showed a substantial gain with makers here in point of bookings over July and the past week has been a good one for orders. Demand is well diversified, but the fact that automobile builders underestimated their sales and requirements of raw material is the principal factor in late activity. It is claimed that it has not been necessary to shade 3.75c., base, Pittsburgh or Cleveland, on new business.

Steel and Iron Bars.—The leading producer is well filled up with steel bar business and with its delivery promises becoming somewhat extended, more business is going to independent manufacturers. Prices still range from 1.90c. to 2c. base, Pittsburgh, but on the ordinary tonnages developing within the Pittsburgh district the higher figure is the ruling one. Outside of the Pittsburgh area and on sizable business, the lower price is the more common one. Iron bars are steady but not very active, because of the lack of railroad buying. Prices are given on page 648.

Structural Material.—Demands upon the mills are fairly heavy but they seem to be greater in specifications against old contracts than in strictly new business. Prices show no change. Fabricated steel business throughout the country is of good volume, but it is the report of local shops that local business lately has not amounted to much. Plain material prices are given on page 648.

Plates.—On very small lots for delivery in the Pittsburgh district 1.90c. base, Pittsburgh, still is being done, but this district does not provide much tonnage and local mills, in order to get some sort of a rolling schedule, find it necessary to go well outside of Pittsburgh for orders and find that 1.80c. is about all they can hope for in competition with outside mills. Some Eastern mills are delivering plates in Pittsburgh at 1.90c. and are quoting 1.80c., Pittsburgh, on business in northern Pennsylvania. The local car building plants are not doing much at present and the lack of

railroad buying is keeping down the activities of other railroad material manufacturers. Plate prices are given on page 648.

Bolts, Nuts and Rivets.—There is still a steady but moderate demand for bolts and nuts, buyers holding to the policy of covering only their immediate requirements. Prices are firm and it is expected that current quotations will be continued for fourth quarter contract business. There is not much snap to the demand for rivets and quotations are subject to some shading on desirable business. Prices and discounts are given on page 649.

Coke and Coal.—A Pittsburgh steel company in the past week has closed for ten cars daily of furnace coke for the month of September, paying \$3.40 per net ton at ovens. Producers now, however, are generally quoting \$3.75 and while this is largely an asking price, at least a few sales have been made at that figure. From \$3.75 to \$4 is asked on fourth quarter contracts, but no actual business has been reported. The market derives its strength not so much because of the demand for metallurgical purposes as it does from the fact that a good deal of coke has been sold for domestic use on account of the suspension of the hard coal mines and there is also the factor that independent operators may be called upon to pay higher wages in the event that the demand reaches proportions to bring into production much idle capacity. There has been no material gain in the demand for foundry coke and prices remain at last week's range. A larger demand for coal finds an ample supply and no material change in prices. Operation of union mines is low because prices are below costs and even the non-union mines with lower costs are not able to dispose of coal at much above costs. Prices are given on page 649.

Old Material.—If the market shows a definite price tendency in the open-hearth grades it is toward lower levels. The Ohio valley steel maker, who as noted a week ago, was bidding \$19 for heavy melting steel, had no trouble in getting about 15,000 tons at that price and also bought a smaller tonnage of compressed and bundled sheets at \$1 and \$2 a ton less, respectively. This company also bought a tonnage of pig iron at about \$19 delivered and had indicated an intention to combat efforts to push up scrap prices by an increased mix of pig iron in the charge. There is very little difference between delivered Pittsburgh district prices of pig iron and heavy melting steel and if the move by this company is typical of the industry at large, an advance in pig iron will have to attend higher prices for steel works scrap. Dealers are finding it a little easier to pick up tonnages of heavy melting steel, this possibly because one mill that bought several weeks ago at \$19.50 is holding up shipments and others that bought at the same figure are not pressing for delivery. Other grades fall within a description of quiet and steady.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel	\$19.00 to \$19.50
No. 1 cast, cupola size	17.50 to 18.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md., Huntington, W. Va., and Franklin, Pa.	20.50 to 21.00
Compressed sheet steel	17.50 to 18.00
Bundled sheets, sides and ends ..	16.50 to 17.00
Railroad knuckles and couplers ..	21.00 to 21.50
Railroad coil and leaf springs ..	21.00 to 21.50
Low phosphorus blooms and billet ends	23.00 to 23.50
Low phosphorus plate and other material	21.50 to 22.00
Railroad malleable	19.00 to 19.50
Steel car axles	21.00 to 21.50
Cast iron wheels	17.50 to 18.00
Rolled steel wheels	21.00 to 21.50
Machine shop turnings	15.00 to 15.50
Short shoveling turnings	15.00 to 15.50
Sheet bar crops	20.00 to 20.50
Heavy steel axle turnings	17.00 to 17.50
Short mixed borings and turnings ..	14.00 to 14.50
Heavy breakable cast	16.50 to 17.00
Stove plate	14.00 to 14.50
Cast iron borings	15.00 to 15.50
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	19.00 to 19.50

Steel plant operations show no special change in the general average as compared with a week ago. The Carnegie Steel Co. is producing ingots at about 70 per cent of capacity, and the average of independent companies is at about the same rate. There was a net gain of four furnaces in this and nearby districts in August. Carnegie Steel Co. and the Jones & Laughlin Steel Corporation each started two furnaces and the Bethlehem Steel Co. one at Johnstown, while the furnace of the A. M. Byers Co. at Girard, Ohio, was blown out. There are now 72 out of 135 furnaces in production.

The coke market has taken a substantial price brace since a week ago, with sales of spot furnace grade noted at \$3.75 per net ton at ovens, while \$3.40 appears to be as low as any recent business has been done. It appears that orders for coke for domestic use have been much larger than had been generally supposed, and coke producers also have been influenced in their price ideas by fears that enlarged operations would be followed by demands by the men for higher wages. The independent producers in the Connellsville district are paying a scale roughly about one-third less than that of the H. C. Frick Coke Co., and as the latter has been putting on ovens in large numbers in the past few weeks, a good many men have left the independent operations to seek work at the Frick plants. That company cannot provide work for all the men that are available, but it is no secret that the existence of two wage scales is a matter of concern to the independent operators.

The appreciation in coke prices as yet has found no reflection in pig iron prices chiefly because demand is light, but also because producers are dubious that higher prices based on higher coke costs could be obtained. Scrap supplies appear to be slightly more plentiful, and the market is not helped by the fact that one steel maker in the past week bought pig iron because it was as cheap as heavy melting steel scrap.

Pig Iron.—The market here is fairly firm but not very active. Steel makers who buy their pig iron are showing very little interest in basic pig iron and the only business of consequence recently done was a purchase of between 5000 and 10,000 tons of that grade by an Ohio Valley steel maker from a neighboring steel company at a delivered price of about \$19. The buyer is a producer of iron but because of the high price of scrap in relation to pig iron took this tonnage of pig iron instead of scrap for stock. The Valley furnace market on this grade remains at \$18. Only small sales of Bessemer iron are noted and these have been at \$19. Valley furnace. Inquiries for foundry iron are somewhat more numerous than they were recently, but the actual turnover still is small, both in the individual sales and the total. The ruling price still is \$18.50 for No. 2 foundry, but \$19 is wanted on fourth-quarter tonnages and that price also has been named for first quarter iron. W. P. Snyder & Co. make the average price for August of Bessemer iron to be \$19 and of basic \$18, the same prices as for July and June.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.76 per gross ton:

Basic	\$18.00
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Low phosphorus, copper free.....	\$27.75 to 28.00

Ferroalloys.—This market does not show much snap, but prices are steady, chiefly because producing costs or other considerations are preventing much pressure to sell. In contrast with some other markets, the demand for ferromanganese here is for small tonnages for early delivery, consumers being interested only in the maintenance of stocks. The market still is quoted at \$115, Atlantic seaboard on both domestic and foreign material, but the reason seems to be in the inability of British producers to sell the material for less and make a profit and British prices govern those of domestic and other foreign material. English exchange is at least 10 per cent higher than it was when British producers sold ferromanganese at \$95, duty paid, and it is said that even though low-priced ore was used, they

suffered a loss at that price. The Steel Corporation which is an occasional seller of ferromanganese sells f.o.b. Pittsburgh, this basis making a slightly lower delivered price than from the seaboard. On some recent business in St. Louis there are counterclaims as to the price. The seller says it was \$115 Atlantic seaboard or the equivalent, while those who failed to get any of the four orders recently placed there say that buyers claimed a lower price. New business in spiegeleisen and 50 per cent ferrosilicon is light but there is a fair movement against contracts. Prices are given on page 649.

Semi-Finished Steel.—There is so little open market activity in billets, slabs and sheet bars in this district that actual prices are not easily determined. Mills here shipping to regular customers on contracts report the market as \$35, Pittsburgh, on all three forms and consumers in this area of billets and slabs say that is the lowest price they have been able to obtain on steel rolled to specification. Mills outside the Pittsburgh district proper, seem to be working toward an f.o.b. mill basis of quotation and quotations on this basis usually figure out less than the equivalent of \$35, Pittsburgh. The ordinary tonnage price on wire rods remains at \$45 base, Pittsburgh and Cleveland, and \$46 Chicago. Specifications against contracts are heavier than they were a month or so ago and there is a steady demand for small lots. On skelp, 1.90c. is easily done. Prices are given on page 649.

Wire Products.—Makers here still are doing a very satisfactory business, although neither jobbers nor manufacturing consumers yet show a pronounced inclination to buy beyond their known requirements. In other words, there is no stocking and the gain in orders is a close reflex of the fact that consumption is good and that distributors and manufacturers lack sufficient stocks to take care of it without recourse to the mills. Everything ordered is wanted promptly and probably as promptly is moving into consumption. With no additions being made to stocks in second hands, the mills are counting strongly on a stocking movement this fall. Mill operations are somewhat above 60 per cent on the average. Prices are steady. They are given on page 648.

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Tubular Goods.—Fall building activities are bringing in a good many rush shipment orders for standard pipe, but in a general way, the pipe market is not quite so active as it was recently. The continued decline in oil prices is having some influence on drilling plans and in turn on the demand for oil country pipe. There is commonly some falling away in this business in the fall, but it has come earlier than usual this year, because of the overproduction in California, the reflection of which is found in large offerings of California gasoline along the Atlantic seaboard. The mills still are well engaged on old line pipe orders and there is a constant flow of small orders. We now estimate pipe mill capacity in this and nearby districts to be producing about 85 per cent, as against about 90 per cent a month ago. Boiler tubes present an unsatisfactory situation in that there are too many sellers for buyers and much price competition. Discounts are given on page 648.

Sheets.—From the angle of business, the situation is fairly satisfactory, but prices still leave something to be desired. Generally, Pittsburgh district mills and those quoting on a Pittsburgh base, are at 3.15c., base for black, 2.30c., base for blue annealed and 4.30c., base for galvanized, but only in the case of black sheets are these prices representative of the bulk of the passing

sales. Plate mill competition with blue annealed sheets is strong and 2.25c., base, is the more common sales base. A few sales of galvanized sheets are reported at the full quotations, but makers sold a good bit of tonnage prior to the advance early in July to 4.20c. and these sheets now are being offered in competition with mill offerings and make hard the effort to get up the price. On really attractive tonnages of black sheets 3.10c. is being done. There seems to be good observance of 4.25c., base (No. 22-gage) on automobile body sheets, demand for which is holding up well, due to the fact that motor car builders are making larger sales than they expected or had prepared for in raw materials purchases. Prices are given on page 648.

Tin Plate.—Mills in this district still are busy, but specifications are lighter with some makers than they have been and it looks as if the packers' requirements had been largely supplied. Makers can see a good production through September, but some decrease thereafter. There is nothing new as to prices.

Cold Finished Steel Bars and Shafting.—The leading maker of ground shafting has announced effective from Aug. 26, a carload base, f.o.b. mill, of 2.80c. for 4 7-16 in. to 7 in. inclusive, 2.90c., for 1 15-16 in. to 4% in., inclusive, and of 3c. for 1 3-16 in. to 1% in. inclusive, these prices subject to the card of extras dated March 10, 1924. This change represents a decline of \$1 to \$2 a ton in the larger sizes, but no change in the smaller sizes. Screw stock bars still are in good demand and August is called the best August in the history of the industry in point of volume. There is not the same satisfaction over prices. The ordinary tonnage price remains at 2.50c., base, Pittsburgh.

Hot-Rolled Flats.—Demand keeps up well in volume, although buyers are not anticipating their requirements and it is because consumption is good that they have to buy so frequently. Prices are steady. It is said there is a slight margin of profit on the right side in the narrow material, but a loss on wide stock for those who buy instead of make their steel. Prices are given on page 648.

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Steel and Iron Bars.—The leading producer is well filled up with steel bar business and with its delivery promises becoming somewhat extended, more business is going to independent manufacturers. Prices still range from 1.90c. to 2c. base, Pittsburgh, but on the ordinary tonnages developing within the Pittsburgh district the higher figure is the ruling one. Outside of the Pittsburgh area and on sizable business, the lower price is the more common one. Iron bars are steady but not very active, because of the lack of railroad buying. Prices are given on page 648.

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Plates.—On very small lots for delivery in the Pittsburgh district 1.90c. base, Pittsburgh, still is being done, but this district does not provide much tonnage and local mills, in order to get some sort of a rolling schedule, find it necessary to go well outside of Pittsburgh for orders and find that 1.80c. is about all they can hope for in competition with outside mills. Some Eastern mills are delivering plates in Pittsburgh at 1.90c. and are quoting 1.80c., Pittsburgh, on business in northern Pennsylvania. The local car building plants are not doing much at present and the lack of

railroad buying is keeping down the activities of other railroad material manufacturers. Plate prices are given on page 648.

Bolts, Nuts and Rivets.—There is still a steady but moderate demand for bolts and nuts, buyers holding to the policy of covering only their immediate requirements. Prices are firm and it is expected that current quotations will be continued for fourth quarter contract business. There is not much snap to the demand for rivets and quotations are subject to some shading on desirable business. Prices and discounts are given on page 649.

Coke and Coal.—A Pittsburgh steel company in the past week has closed for ten cars daily of furnace coke for the month of September, paying \$3.40 per net ton at ovens. Producers now, however, are generally quoting \$3.75 and while this is largely an asking price, at least a few sales have been made at that figure. From \$3.75 to \$4 is asked on fourth quarter contracts, but no actual business has been reported. The market derives its strength not so much because of the demand for metallurgical purposes as it does from the fact that a good deal of coke has been sold for domestic use on account of the suspension of the hard coal mines and there is also the factor that independent operators may be called upon to pay higher wages in the event that the demand reaches proportions to bring into production much idle capacity. There has been no material gain in the demand for foundry coke and prices remain at last week's range. A larger demand for coal finds an ample supply and no material change in prices. Operation of union mines is low because prices are below costs and even the non-union mines with lower costs are not able to dispose of coal at much above costs. Prices are given on page 649.

Old Material.—If the market shows a definite price tendency in the open-hearth grades it is toward lower levels. The Ohio valley steel maker, who as noted a week ago, was bidding \$19 for heavy melting steel, had no trouble in getting about 15,000 tons at that price and also bought a smaller tonnage of compressed and bundled sheets at \$1 and \$2 a ton less, respectively. This company also bought a tonnage of pig iron at about \$19 delivered and had indicated an intention to combat efforts to push up scrap prices by an increased mix of pig iron in the charge. There is very little difference between delivered Pittsburgh district prices of pig iron and heavy melting steel and if the move by this company is typical of the industry at large, an advance in pig iron will have to attend higher prices for steel works scrap. Dealers are finding it a little easier to pick up tonnages of heavy melting steel, this possibly because one mill that bought several weeks ago at \$19.50 is holding up shipments and others that bought at the same figure are not pressing for delivery. Other grades fall within a description of quiet and steady.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel	\$19.00 to \$19.50
No. 1 cast, cupola size	17.50 to 18.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md., Huntington, W. Va., and Franklin, Pa.	20.50 to 21.00
Compressed sheet steel	17.50 to 18.00
Bundled sheets, sides and ends..	16.50 to 17.00
Railroad knuckles and couplers..	21.00 to 21.50
Railroad coil and leaf springs..	21.00 to 21.50
Low phosphorus blooms and billet ends	23.00 to 23.50
Low phosphorus plate and other material	21.50 to 22.00
Railroad malleable	19.00 to 19.50
Steel car axles	21.00 to 21.50
Cast iron wheels	17.50 to 18.00
Rolled steel wheels	21.00 to 21.50
Machine shop turnings	15.00 to 15.50
Short shoveling turnings	15.00 to 15.50
Sheet bar crops	20.00 to 20.50
Heavy steel axle turnings	17.00 to 17.50
Short mixed borings and turnings	14.00 to 14.50
Heavy breakable cast	16.50 to 17.00
Stove plate	14.00 to 14.50
Cast iron borings	15.00 to 15.50
No. 1 railroad wrought.....	15.50 to 16.00
No. 2 railroad wrought.....	19.00 to 19.50

Chicago

Surprisingly Large Pig Iron Sales—Steel Deliveries Extending

CHICAGO, Sept. 1.—Pig iron sales in August were surprisingly large, ranking with those of the best previous months of the year. Merchant furnaces are comfortably booked for the remainder of the year and fourth quarter buying is still under way. In finished steel, on the other hand, there is still comparatively little forward contracting, although certain commodities, notably wire products, are commencing to feel a movement in that direction. Sales for early shipment, however, are steadily increasing. In the heavier products such as bars, shapes and plates new business booked by local mills is the heaviest for any week since the close of July, while specifications are not only in excess of shipments but bulk the largest since April. Inquiries are light for the reason that most orders are placed without going through the formality of issuing requests for figures. This, of course, is another evidence of the depletion of consumers' stocks and the necessity for their prompt replenishment. Just how much longer buyers can place dependence on the mills for expeditious service is a question which is receiving more attention. Some of the local mills, particularly bar mills, have been gradually accumulating heavier obligations, with the result that they are slowly extending deliveries. The lightening up of the delivery situation, although not yet serious, has given the local market a stronger undertone, notwithstanding continued weakness in other producing centers and in neutral territories.

Local mills continue to operate at 75 to 80 per cent of ingot capacity, with the likelihood that the next change will be in the direction of still heavier output. The Youngstown Sheet & Tube Co. contemplates blowing in its second stack at Indiana Harbor within a week or two. This will increase the number of active steel works blast furnaces to 23 out of a total of 35 in the district.

The extent of railroad buying this fall is the greatest market uncertainty. Encouragement is derived from the fact that the Chesapeake & Ohio has definitely entered the market for 50 heavy freight locomotives and may inquire for a total of 110. This road is also counted on to come out for 20,000 freight cars, following a favorable decision by the Interstate Commerce Commission in the Vansweringen merger case. The commission is expected to take definite action one way or the other before Oct. 1.

Pig Iron.—August sales of Northern furnaces were substantially as large as those of any previous month of the year. While buyers at no time have come into the market with a rush, a steady stream of business has developed from week to week. Considerable forward contracting has been done and Chicago district stacks are now comfortably booked through the fourth quarter. A number of melters have sought to cover their first quarter needs and in a few instances business for that delivery has been taken at an advance of 50c. a ton, namely on the basis of \$21, Chicago furnace. Producers, however, are not anxious to commit themselves so far ahead, particularly in view of the recent turn in the coal market. Coking coal has advanced 50c. a ton and any further stiffening of fuel prices may force furnaces to advance prices for early as well as for remote deliveries. That buyers also are watching the fuel situation is indicated by an increase in both sales and inquiry. An Illinois melter is in the market for 3000 tons of foundry for fourth quarter. A malleable inquiry for the same delivery calls for 2000 tons. A local buyer wants 1500 tons of foundry for first quarter. Sales include 1500 tons of foundry to an Illinois user and 600 tons and 500 tons of foundry to local melters, all for fourth quarter shipment. Merchant furnaces in this district are fully engaged taking care of current consumption. If railroad equipment plants, which are now operating at a low rate, increase their schedules, it may prove necessary to blow in some of the stacks which are still

idle. There are really only two large modern furnaces in this class, one at Mayville and one at the Iroquois plant. The fourth Iroquois stack is regarded as a high cost furnace. The prospective blowing in of a second Youngstown company steel works stack at Indiana Harbor will release some additional iron for merchant sales. Southern foundry for barge and rail delivery is unchanged for current shipment, but is quoted at an advance of 50c. or at \$23.18, delivered, for fourth quarter. Sales of 300 tons for early shipment and 500 tons for fourth quarter have been made. A sale of a carload of Alabama foundry brought \$18.50, base, Birmingham. No recent transactions in Tennessee foundry are reported, but presumably it is still available at \$17.50, base, Birmingham. Detroit producers are said to have advanced to \$21, base, furnace, and the Toledo stack to \$20, base, but no sales at these levels have been reported in this vicinity. A purchase of 150 tons of 8 per cent silvery has been made at \$25.50, Jackson, indicating an advance of 50c. a ton. For some time producers have been quoting \$26, but without succeeding in selling much material at that price. Fourteen to 16 per cent ferrosilicon ranges from \$44 to \$44.50, delivered, although a sale of 100 tons brought a higher price.

Quotations on Northern foundry, high phosphorus, malleable and basic iron are f.o.b. local furnaces and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards.

Northern No. 2 foundry, sil. 1.75 to 2.25	\$20.50
Northern No. 1 foundry, sil. 2.25 to 2.75	21.00
Malleable, not over 2.25 sil.	20.50
High phosphorus	20.50
Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	29.04
Southern No. 2 (all rail)	\$23.51 to 24.51
Southern No. 2 (barge and rail)	22.68
Low phos., sil. 1 to 2 per cent, copper free	31.20
Silvery, sil. 8 per cent	30.29 to 30.79
Ferrosilicon, 14 to 26 per cent	44.00 to 44.50

Ferroalloys.—A carload of spiegeleisen brought \$35, Jackson County furnace, or \$40.04 delivered. A few carlot sales of ferromanganese brought out no change in the price.

We quote 80 per cent ferromanganese, \$122.56, delivered; 50 per cent ferrosilicon for 1925 delivery, \$85, delivered; spiegeleisen, 18 to 22 per cent, \$39.76 to \$40.04, delivered.

Fluorspar.—A local user has closed for 500 tons of 85 per cent gravel fluorspar at less than \$16, f.o.b., Illinois mines.

Plates.—So much hinges on a revival of railroad car buying that the slightest indication of a move in that direction receives attention. There is now said to be definite assurance that a number of Western lines will soon enter the market for several thousand cars, but the identity of these roads has not been disclosed. Meanwhile there are two definite inquiries for 1000 cars pending, those of the Illinois Central and the New York Central, and it is regarded as more than a mere possibility that when purchases are actually made they will total 5000 to 10,000 cars each.

The mill quotation is 2.10c., Chicago. Jobbers quote 3.10c. for plate out of stock.

Bars.—The gradual extension of deliveries on soft steel bars indicates that local mills are accumulating substantial backlogs, a fact which is also indicated by the continued excess of specifications over shipments. In fact, specifications for the month of August were more than 50 per cent heavier than those for July. Demands from the farm equipment industry continue to expand, with production averaging 75 to 80 per cent and still on the increase. An important implement maker who had covered for his supposed needs for the remainder of the year has found it necessary to place additional orders for 3500 tons of bars. Bar consumption by the automobile plants is heavy and demands for reinforcing steel are large, pending projects calling for an aggregate of 20,000 tons. Soft steel bars are holding at 2.10c., Chicago, notwithstanding greater weakness in competitive territories. Bar iron mills have not been able to build up much of a backlog, although demand has shown some improvement. The price situation, however, is still weak, with 1.90c. to 1.95c., Chicago, generally quoted. As low as 1.85c., Chicago, has been done in exceptional instances. Rail

steel bar mills are well booked, a Chicago Heights mill which is operating double turn being committed for 60 days. These producers have benefited by an unusual demand for fence posts, said to be the heaviest this year.

Mill prices are: Mild steel bars, 2.10c.; common bar iron, 1.90c. to 2c., Chicago; rail steel, 2c., Chicago and 2c., mill.

Jobbers quote 3c. for steel bars out of warehouse. The warehouse quotations on cold-rolled steel bars and shafting are 3.60c. for rounds and hexagons and 4.10c. for flats and squares; 4.15c. for hoops and 3.65c. for bands.

Jobbers quote hard and medium deformed steel bars at 2.60c.

Structural Material.—Local bookings of plain material in August surpassed those of July by 50 per cent. Specifications during the week exceeded shipments, and on a few sizes and shapes local mills are commencing to fall behind on deliveries. Assurance of prompt delivery enabled an Eastern mill to book an order in this market for 100 tons at several dollars a ton above the local prices. On the whole, however, service from local producers is still satisfactory.

The mill quotation on plain material is 2.10c., Chicago. Jobbers quote 3.10c. for plain material out of warehouse.

Wire Products.—Owing to the customary summer lull in the wire trade, August specifications are never heavy, but those for the month just closed were the largest for any August in eight years. Moreover, new commitments were the best since August, 1922. Notwithstanding these encouraging indications, there is still no noticeable rush of jobbers to cover their forward needs. Contracting is slowly gaining headway, however, and in some instances important distributors in this section have taken action. Mill operations likewise are expanding gradually, now averaging 60 to 65 per cent. Woven wire fence demand has improved materially since the announcement of spring terms. Wire nails, however, remain surprisingly dull in the face of long sustained building activity and the steady depletion of jobbers' stocks. Specifications for wire mesh have been liberal, although the paving season is practically over. Demand from the manufacturing trade is improving and in some instances contracts through fourth quarter have been closed. Mill prices, which are substantially unchanged, are shown on page 648.

We quote warehouse prices f.o.b. Chicago: No. 8 black annealed wire, \$3.05 per 100 lb.; common wire nails, \$3.15 per keg; cement coated nails, \$2.15 to \$2.20.

Sheets.—Local prices are steady and unchanged, and while advances are looked for, they will probably await further stabilization of the markets East of here, which are not yet entirely free from weak spots. It is thought likely, however, that when Western mills finally open their books for the fourth quarter, they will raise prices at least \$2 a ton. Meanwhile specifications are liberal and mill operations are as heavy as the hot weather will permit.

Chicago delivered prices from mill 3.35c. to 3.40c. for No. 28 black, 2.45c. to 2.50c. for No. 10 blue annealed and 4.40c. to 4.45c. for No. 28 galvanized. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Jobbers quote f.o.b. Chicago: 3.50c. base for blue annealed, 4c. base for black, and 5c. base for galvanized.

Cast Iron Pipe.—Detroit has placed 12,300 tons of 8 to 24-in. with the low bidders, 2500 tons going to the Lynchburg Foundry Co. and 9800 tons to the United States Cast Iron Pipe & Foundry Co. The latter company has also booked 868 tons for Chicago. Quincy, Ill., has placed 100 tons of 6 and 8-in. with the National Cast Iron Pipe Co.

We quote per net ton f.o.b. Chicago, as follows: Water pipe, 4-in., \$53.20 to \$54.20; 6-in. and over, \$49.20 to \$50.20; Class A and gas pipe, \$4 extra.

Bolts, Nuts and Rivets.—Bolt and nut makers will shortly open their books for fourth quarter at unchanged discounts, with the possible exception of stove bolts, which may be advanced. For mill prices see page 649.

Jobbers quote structural rivets, 3.50c.; boiler rivets, 3.70c.; machine bolts up to $\frac{3}{4}$ x 4 in., 55 per cent off; larger sizes, 55 off; carriage bolts up to $\frac{3}{4}$ x 4 in., 50 off; larger sizes, 50 off; hot-pressed nuts, squares, tapped or blank, \$3.50 off; hot-pressed nuts, hexagons, tapped or blank, \$4 off; coach or lag screws, 60 per cent off.

Reinforcing Bars.—The leading award of the week, 1300 tons of reinforcing for Section 11, South Water Street double decking, Chicago, went to the Kalman Steel Co. Other current lettings bulk large in the aggregate, and tonnage still pending is unusually heavy. Billet steel reinforcing bars are steady at 2.60c., Chicago warehouse. Lettings include:

Section 11, South Water Street double decking, Chicago, 1300 tons, to Kalman Steel Co.

Francis Waldman Hotel, 6241 Winthrop Avenue, Chicago, 100 tons of rail steel, to Calumet Steel Co.

Chicago, North Shore & Milwaukee Railroad, Oklahoma Avenue crossing, Milwaukee, 115 tons, to Concrete Engineering Co.

Addition to Morton high school, Cicero, Ill., 100 tons, to Concrete Engineering Co.

South Park Board, Buckingham Memorial, Grant Park, Chicago, 100 tons, to Joseph T. Ryerson & Son.

Protestant Home for Aged, Milwaukee, Wis., 100 tons, to Concrete Engineering Co.

Apartment building, Jeffrey Avenue and Sixty-seventh Street, Chicago, 130 tons, to Olney J. Dean & Co.

Indiana State road work, 190 tons, to Concrete Steel Co.

South Park Board, Tully Park natatorium, 100 tons, to Concrete Steel Co.

State highway bridge, Baraboo, Wis., 100 tons, to Joseph T. Ryerson & Son.

Pending work includes:

South Park Board, Chicago, addition to Grant Park stadium, 1300 tons, general contract awarded to John Griffiths & Sons Co.

Pilbrico Co. plant, Chicago, 150 tons, general contract to E. W. Sproul Co.

Rockefeller Chapel, University of Chicago, Chicago, 100 tons, general contract awarded to Leonard Construction Co.

Public school, Carmen and Kenneth Streets, Chicago, 150 tons, general contract awarded to S. N. Nielsen Co.

Lake Shore Athletic Club, Chicago, 250 tons, general contract awarded to Hegeman-Harris Co.

Illinois Masonic Hospital, 834 Wellington Avenue, Chicago, 115 tons, George F. Schreiber, Chicago architect.

Cold Finished Steel Bars.—Local mills have opened up their books for the fourth quarter at 2.50c., Chicago, and with the market steady and demand in fair volume, it is thought that this price will hold through the remainder of the year.

Old Material.—A leading local mill has placed orders for 20,000 tons of heavy melting at \$17 per gross ton delivered. This business was widely distributed and in part covered distress cars, which had to be disposed of. The market is less buoyant than for some time, but such changes in prices as have developed have been advances.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$18.50 to \$19.00
Cast iron car wheels	18.00 to 18.50
Relaying rails, 56 lb. to 60 lb.	25.00 to 26.00
Relaying rails, 65 lb. and heavier ..	26.00 to 31.00
Forged steel car wheels	20.00 to 20.50
Railroad tires, charging box size ..	20.50 to 21.00
Railroad leaf springs, cut apart ..	20.50 to 21.00
Rails for rolling	19.50 to 20.00
Steel rails, less than 3 ft.	21.50 to 22.00
Heavy melting steel	16.75 to 17.00
Frogs, switches and guards, cut apart	18.25 to 18.75
Shoveling steel	16.50 to 16.75
Drop forge flashings	12.50 to 13.00
Hydraulic compressed sheets	14.50 to 15.00
Axle turnings	14.50 to 15.00
Steel angle bars	20.50 to 21.00
Steel knuckles and couplers	20.00 to 20.50
Coil springs	20.50 to 21.00
Low phos. punchings	19.00 to 19.50
Machine shop turnings	10.50 to 11.00
Cast borings	13.50 to 14.00
Short shoveling turnings	13.50 to 14.00
Railroad malleable	19.50 to 20.00
Agricultural malleable	18.50 to 19.00

Per Net Ton	
Iron angle and splice bars	18.00 to 18.50
Iron arch bars and transoms	21.50 to 22.00
Iron car axles	27.50 to 28.00
Steel car axles	18.00 to 18.50
No. 1 busheling	13.50 to 14.00
No. 2 busheling	9.50 to 10.00
Pipes and flues	12.00 to 12.50
No. 1 railroad wrought	16.75 to 17.25
No. 2 railroad wrought	15.00 to 15.25
No. 1 machinery cast	18.00 to 18.50
No. 1 railroad cast	17.50 to 18.00
No. 1 agricultural cast	17.00 to 17.50
Locomotive tires, smooth	16.50 to 17.00
Stove plate	15.50 to 16.00
Grate bars	15.50 to 16.00
Brake shoes	15.50 to 16.00

New York

Structural Steel the Leading Factor— Hotel and Subway Contracts

NEW YORK, Sept. 1.—On the whole the buying of foundry iron is less in this district than in the preceding week, apart from the activities of one outstanding buyer. The American Radiator Co. has been in the market for 10,000 tons for the Bayonne, N. J., plant, and eastern sellers have had before them an inquiry for 6000 tons for another plant of this company. It is understood the iron desired for Bayonne has been bought and that deliveries extend over the fourth quarter. Reports from other markets indicate that the company has been buying also for plants in the Middle West. It would appear that large buyers in New England and the metropolitan territory are fully covered for their fourth quarter consumption, unless their foundries should come to operate at more than the expected rate later in the year. Among the week's purchases in this market are 200 tons of No. 2 plain iron for an eastern Pennsylvania plant of a large interest; 500 tons of German iron equivalent to No. 1X, which sold at slightly under \$21, duty paid; and several lots for early delivery. In general, foundry operations continue as in August, though in a number of cases iron is wanted for quick delivery, and the reported changes in jobbing foundry schedules represent larger operation. The \$18.50 Buffalo basis for foundry iron is still commonly quoted, but buyers report concessions. The calling of the anthracite strike has made no difference in the foundry iron market, but sellers of foundry coke have advanced their prices, 50 cents higher being obtained in some cases.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 2, sil. 1.75 to 2.25	\$23.02 to \$23.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.52 to 24.02
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	24.02 to 24.52
Buffalo, sil. 1.75 to 2.25	23.41 to 23.91
No. 2 Virginia, sil. 1.75 to 2.25	28.44 to 28.94

Ferroalloys.—The ferromanganese market is quieter than in some time, with both sales and inquiries limited to a few 100-ton and smaller lots. The price situation is firm. Demand for spiegeleisen is also light, with sales and inquiries in moderate volume.

Warehouse Market.—There has been a decline in activity all along the line. August's volume of business was 10 to 15 per cent below July, but July was unusually active. Demand for tubular products and shafting and screw stock is quiet, mill activity in these lines being brisk. Prices are unchanged. In sheets small jobbers are quoting as low as 4.90c., base, for galvanized, but the bulk of the buying is on a basis of 5.25c. for No. 28 gage. Demand for galvanized is fair, but very quiet in black sheets. We quote boiler tubes per 100 ft. as follows:

Lapwelded steel tubes, 2-in., \$17.33; seamless steel, 2-in., \$20.21; charcoal iron, 2-in., \$25; 4-in., \$67.

Finished Iron and Steel.—August brought a fairly substantial gain in steel business over that of July. In the case of the leading Eastern company the gain amounted to 25 per cent. One of the Pittsburgh district mills made a surprising record in August, its tonnage for the month in its New York office exceeding that of any month this year. Structural steel made a particularly good record, the total tonnage exceeding that of July, which is contrary to the usual experience. Prospects are that September tonnage will show a gain over August. Fabricated steel prices are showing firmness and this is hastening the placing of many building contracts. About 8000 tons of steel will be required for the Statler Hotel, Boston, the general contract for which has been awarded to Dwight P. Robinson & Co., New York. This is the largest pending project in the East. Next in size is another section of the New York subways, calling for 5700 tons. The

price situation has shown little change except that apparently some of the mills are making an effort to stiffen the prices of those products where the greatest weakness has developed. There is more evidence that 1.90c. on steel bars is not being given to all buyers and a fairly good share of the week's orders have been at 2c., Pittsburgh. Plates are weak and attractive tonnages can be bought quite easily at 1.75c., Pittsburgh, from some Eastern mills, though 1.80c. is the usual quotation. In some cases Pittsburgh mills will meet the quotations of Eastern mills. Structural shapes remain at 1.90c. to 2c., Pittsburgh, with the equivalent of 1.80c. or 1.85c., Pittsburgh, being quoted occasionally by one or two Eastern mills. Sheets and wire products remain unchanged and fairly firm. Reduced selling prices of gasoline are said to be responsible for the abandonment of several prospective pipe line projects involving a good many thousand tons of steel.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.24c. to 2.34c.; plates, 2.09c. to 2.19c.; structural shapes, 2.14c. to 2.24c.; bar iron, 2.14c. to 2.24c.

Cast Iron Pipe.—An inquiry has been received for 11,000 to 30,000 ft. each of practically all sizes from 4- to 30-in. pipe for a city in the Philippines. Domestic inquiry is confined chiefly to carlots or less to supplement previous orders. Beverly Hills, Cal., placed 500 tons with a French maker, and New York City 500 tons through a contractor. New Orleans is expected to ask bids soon on 3500 to 4000 tons of 4- to 24-in. Other purchases include 1200 tons for a city in Florida, 200 tons for Mexico and several lots of 25 to 150 tons for Southern towns. Competition among foundries now is based in large measure on deliveries.

We quote pressure pipe per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$50.60 to \$51.60; 4-in. and 5-in., \$55.60 and \$56.60; 3-in., \$65.60 to \$66.60, with \$5 additional for Class A and gas pipe. Discounts of both Northern and Southern makers of soil pipe, f.o.b. New York, are as follows: 6-in., 45 to 50 per cent off list; heavy, 55 to 60 per cent off list.

Old Material.—While the scrap market has held its strength, there have been no developments in the past week to increase prices. At least three Eastern mills are offering \$17, delivered, for heavy melting steel, but apparently they are not getting very much at this price. Many dealers are not willing to sell a tonnage at less than \$18. Demand for rolling mill and foundry grades of scrap is only fair.

Buying prices per gross ton New York follows:

Heavy melting steel, yard	\$11.75 to \$12.25
Heavy melting steel (railroad or equivalent)	13.25 to 13.75
Rails for rolling	14.25 to 14.75
Relaying rails, nominal	23.00 to 24.00
Steel car axles	21.50 to 22.00
Iron car axles	24.00 to 24.50
No. 1 railroad wrought	14.00 to 14.50
Forge fire	10.50 to 11.00
No. 1 yard wrought, long	13.00 to 13.50
Cast borings (steel mill)	9.50 to 10.00
Cast borings (chemical)	13.00 to 14.00
Machine shop turnings	9.25 to 10.00
Mixed borings and turnings	9.00 to 9.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	12.00 to 12.50
Stove plate	10.50 to 12.00
Locomotive grate bars	11.00 to 11.50
Malleable cast (railroad)	15.00 to 15.50
Cast iron car wheels	13.50 to 14.00
No. 1 heavy breakable cast	13.75 to 14.25

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	\$17.50 to \$18.00
No. 1 heavy cast (columns, building material, etc.), cupola size	16.00 to 16.50
No. 2 cast (radiators, cast boilers, etc.)	15.00 to 15.50

The Gary Tube Co., new subsidiary of the United States Steel Corporation, Gary, Ind., now has four butt weld mills in operation. The fifth and only remaining butt weld mill has not been entirely completed. Two lap weld mills are running, while two are still in process of construction. A new seamless tube mill has been in operation for several months. The galvanizing plant of the tube works was placed in operation for the first time a few days ago.

San Francisco

Validation of Mokelumne Bonds Clears Way for Bids Sept. 4—Market Quiet

SAN FRANCISCO, Aug. 29 (By Air Mail).—Validation of the \$39,000,000 bond issue of the East Bay Municipal Utility District, Oakland, Cal., for development of the waters of the Mokelumne River, has been affirmed by the Supreme Court of California, sustaining the decision of the superior court in favor of the district. This decision will allow the district to proceed with the disposal of the bonds, and to start work on the Mokelumne project, which calls for about 85,000 tons of plates, 225 tons of structural material, 630 tons of reinforcing bars, 110 tons of cast iron pipe and large quantities of miscellaneous materials and equipment, for which bids close Sept. 4. Discussions in some quarters during the past week developed into an assumption that the job may go concrete, but relatively few of the steel men incline to this belief. It probably will be some time before awards are made, as the plans and specifications are detailed and complicated.

Compared with the two preceding weeks, the past one was relatively quiet. Few fresh inquiries have come up and, although the volume of small business is substantial in the aggregate, there have been few large lettings in the heavier forms of finished steel. With the exception of weaker tendencies in pig iron, and a somewhat stronger tone in the scrap market, prices are virtually on the basis of a week ago.

Pig Iron.—Recent sales of small lots, and the continued lack of interest on the part of large buyers, have developed a weaker price tone in respect to foreign irons. A moderate tonnage of Dutch foundry iron is understood to have been sold at Seattle recently for about \$24.25, duty paid, f.o.b. cars. Local sellers are not disposed to meet this figure, although some Dutch iron has been sold here at about \$25. Prices are being more or less generally shaded for orders of any size, although few large tonnages have been called for recently.

*Utah basic	\$27.00 to \$28.00
*Utah foundry, sil. 1.75 to 2.25 ..	27.00 to 28.00
**English foundry	26.00
**Belgian foundry	25.00
**Dutch foundry	24.25 to 25.00
**Indian foundry	25.00
**German foundry	25.00 to 26.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Shapes.—About 1045 tons was awarded during the week. The largest inquiry developed was 385 tons for the Leamington Hotel, Oakland, Cal., the first two stories structural steel, and the 17 stories above reinforced concrete, for which about 450 tons of bars will be required. The largest single award reported was 600 tons, taken by the United States Steel Products Co. Practically all of the local fabricating shops are busy, and some of the fabricators state that they have never handled such a large number of 25 and 50-ton jobs as are now being placed daily. Prices continue unchanged at 2.35c. to 2.40c., c.i.f. Coast ports. The Elwa River Bridge, Clallam County, Wash., which called for 273 tons, has been changed to a concrete job.

Plates.—Because of the absence of fresh inquiries, and the apathetic interest of buyers, Eastern mills are finding it difficult to get more than 2.30c., c.i.f. Coast ports. In some instances 2.35c. is still being quoted, but the present market is now virtually on a 2.30c. basis for moderate tonnages. The Western States Gas & Electric Co., Stockton, Cal., recently put out an inquiry for 2500 tons for a gas holder, which probably will be placed through Chicago.

Bars.—Better interest developed during the past week for both soft steel and reinforcing bars. Local mills continue to quote 2.45c., f.o.b. San Francisco, for 100-ton lots, and 2.50c. per 100 lb. Reinforcing bar jobbers are quoting 3.25c. base, 250 tons from stock; 3.35c., carload; and 3.80c., l.c.l. The Commissioner of Public Works, Idaho, will receive bids at Salmon, Idaho, until Sept. 9 for a six-span concrete arch bridge

over the Salmon River, which will require 112 tons of reinforcing bars. Flood control work at Edenburg, Tex., calls for 175 tons; bids close Sept. 22. Among the larger lettings placed recently were the following:

Los Angeles, specification P. 540, 150 tons, to Truscon Steel Co.
Medico-Dental Building, Eighth and Francisco Streets, Los Angeles, 249 tons, to George L. Eastman Co.
California Lutheran Hospital, Ninth and Hope Streets, Los Angeles, 531 tons, to George L. Eastman Co.
Builders' Exchange Building, Seventh and Los Angeles Streets, Los Angeles, 230 tons, to Truscon Steel Co.
Elwa River Bridge, Clallam County, Wash., 100 tons, to unnamed firm.

Sheets.—Little business is being done. Several of the Eastern mills have named 2.25c. Pittsburgh on blue annealed sheets, and 4.20c., Pittsburgh or less, is possible on galvanized sheets. Black sheets are nominally 3.15c. to 3.20c., Pittsburgh.

Rails and Track Supplies.—The Charles Nelson Lumber Co., San Francisco, has placed 500 tons of 50-lb. relaying rails. An interest in the central part of the State is understood to be inquiring for about 700 tons of 60-lb. rails, and the San Francisco Municipal Railroad Co. is inquiring for about five carloads of frogs, switches and similar street railway special work material. The Sacramento Municipal Water District is understood to be preparing plans for development of the Silver Lake project, for which bonds are to be voted in November. Reports indicate that this work may require about 3000 tons of 50 or 55-lb. rails. If the bonds are voted, bids will be called early in 1926. Plans have been made by the Finkbiné-Guild Lumber Co., Gulfport, Miss., and work will start within a month, for the construction of 30 miles of logging railroad.

Warehouse Business.—Jobbers' sales during August were slightly better than in July, and somewhat ahead of last year. Business during the week was moderate and prices remain unchanged.

Merchant bars, \$3.30 base, per 100 lb.; merchant bars, $\frac{3}{4}$ in. and under, rounds, squares and flats, \$3.80 base, per 100 lb.; soft steel bands, \$4.15 base, per 100 lb.; angles, $\frac{3}{4}$ in. and larger \times 1 $\frac{1}{2}$ in. to 2 $\frac{3}{4}$ in., inc., \$3.30 base, per 100 lb.; channels and tees, $\frac{3}{4}$ in. to 2 $\frac{3}{4}$ in., inc., \$3.90 base, per 100 lb.; angles, beams and channels, 3 in. and larger, \$3.30 base, per 100 lb.; tees, 3 in. and larger, \$3.30 base, per 100 lb.; universal mill plates, $\frac{1}{4}$ in. and heavier, stock lengths, \$3.30 base, per 100 lb.; spring steel, $\frac{1}{4}$ in. and thicker, \$6.30 base, per 100 lb.; wire nails, \$3.50 base, per 100 lb.; cement coated nails, \$3 base, per 100 lb.; No. 10 blue annealed sheets, \$3.70 per 100 lb.; No. 28 galvanized sheets, \$5.75 per 100 lb.; No. 28 black sheets, \$4.65 per 100 lb.

Cast Iron Pipe.—While a number of projects are up for figures, public lettings have been small in number. Modesto, Cal., awarded 128 tons of 4, 6 and 8-in. B, to McWane Cast Iron Pipe Co. Glendale, Cal., has closed bids for about 2907 tons. Low bids were as follows: Grinnell Co. of the Pacific, \$4.39 for 200 ft. of 20-in. B; United States Cast Iron Pipe & Foundry Co., \$9.90 for 2200 ft. of 30-in. C; Grinnell Co. of the Pacific, \$7.99 for 15,000 ft. of 30-in. B; R. D. Wood Co. bid 7c. per lb. for 50 tons of fittings.

Coke.—A local importer received 4000 tons of English coke during the past week, most of which has been sold locally and in the Los Angeles district. Buying is confined to small tonnages.

English beehive, \$15 to \$16 at incoming dock, and English by-product, \$12 to \$14; German by-product, \$11.50 to \$12.

Old Material.—Although little buying has been done recently, the price situation in the scrap market has strengthened. Asking prices are about \$1 a ton higher than they were. Because of the fairly large supply of cast scrap available, prices in this item are considerably weaker, one lot having been sold recently for about \$19.50. Interest is expected to materialize into a buying movement shortly after the first of the month.

Prices for scrap delivered to consumers' yards are as follows:

	Per Gross Ton
No. 1 heavy melting steel	\$11.50 to \$12.00
Scrap rails, miscellaneous	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Couplers and knuckles	11.50 to 12.00
Mixed borings and turnings	6.00 to 6.50
Country mixed scrap	8.00 to 8.50
No. 1 cast scrap	19.50 to 20.00

Boston

Pig Iron Sales Holding Up Well, With Buffalo Prices Firmer

BOSTON, Sept. 1.—Pig iron sales hold up well, although bookings the past week fell off somewhat. Large consumers having covered requirements for the remainder of 1925, current buying centers in the jobbing foundry trade. An eastern Massachusetts foundry bought 900 tons No. 2X Buffalo, last quarter delivery, at \$23.91 delivered, or \$19 furnace, the largest individual transaction the past week. That price appears to be the prevailing one for No. 2 plain and No. 2X Buffalo district iron today, no sales at \$18.50 furnace base being made recently. Western Pennsylvania iron with a \$5.91 freight is moderately active at \$18.50 furnace for No. 2X, and foreign iron is still a factor. Little activity is noted in other domestic irons, however. Both Dutch and India iron are quoted on a basis of \$22, f.o.b. dock Boston, duty paid, and is closely sold up. Continental iron is available for about \$1 a ton less.

We quote delivered prices on the basis of the latest sales as follows, having added \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia, and \$9.60 from Alabama:

East. Penn., sil. 1.75 to 2.25.....	\$23.90 to \$24.65
East. Penn., sil. 2.25 to 2.75.....	24.40 to 25.15
Buffalo, sil. 1.75 to 2.25.....	23.91
Buffalo, sil. 2.25 to 2.75.....	23.91 to 24.41
Virginia, sil. 1.75 to 2.25.....	27.92 to 28.92
Virginia, sil. 2.25 to 2.75.....	28.42 to 29.42
Alabama, sil. 1.75 to 2.25.....	28.10 to 28.60
Alabama, sil. 2.25 to 2.75.....	28.60 to 29.10

Shapes and Plates.—The market for shapes is more active. Moderately large tonnages presumably will be placed with fabricators this week. It is definitely settled, after many months, to erect a Statler hotel in Boston calling for 8500 tons of steel, which will be bought direct by the Statler interests. The market for shapes is holding at \$2.265 to \$2.365 per 100 lb. delivered. While \$2.165 delivered is the prevailing price on plates, \$2.115 delivered has been done recently, equivalent to \$1.75 on cars Pittsburgh.

Cast Iron Pipe.—Following the recent placing of large tonnages by Lynn, Mass., and Providence, R. I., the market has grown quiet, current business being confined to small lots on which no open bids are asked. Pipe makers are reported as sold ahead ten weeks to three months on small pipe. Their position on large pipe is not as strong, consequently small price concessions are obtainable. Prices quoted locally on domestic cast iron pipe follow: 4-in., \$60.10 a ton delivered common Boston freight rate points; 6-in. to 16-in., \$56.10; 20-in. and larger, \$55.10. The usual \$5 differential on Class A and gas pipe is demanded.

Coke.—Both the New England Coal & Coke Co. and the Providence Gas Co. made no change in their by-product foundry coke price for September specifications against contracts. The companies state, however, that the situation is unsettled because of the coal strike and because of the recent advance of \$1 a ton in coal going into the manufacture of by-product foundry coke. They say the \$12 a net ton delivered where the freight does not exceed \$3.10 price may change before the close of the month. The domestic coke market is 50c. a ton higher at \$13. Many New England foundries are stocking fuel. One producer is behind on shipments, but the other is up to schedule and has a comfortable surplus stock to fall back on in the case of a pinch. Buying of Connellsville district foundry coke in this territory proved a flash in the pan, no sales of importance being made the past week.

Old Material.—Comparatively little old material changed hands the past week. Local interests supplying the Pennsylvania steel mill trade having no orders of consequence, offered prices for material are less firm. A Bridgeport, Conn., consumer has dropped its f.o.b. on cars shipping point price on heavy melting steel 50c. a ton to \$11.25, and the market for Pennsylvania shipment possibly is off as much, although the lack of actual sales makes it difficult to determine this point. Holders' ideas of prices on borings, turnings,

cotton ties, forged scrap and skeleton are out of line with buyers, consequently something of a deadlock exists. Eastern Pennsylvania mills have stopped buying pipe in this market. New England foundries are using increasing amounts of machinery cast, but are supplying wants from local or nearby yards, generally at prices slightly under those quoted here.

The following prices are for gross ton lots delivered consuming points:

Textile cast	\$20.00 to \$21.00
No. 1 machinery cast	19.00 to 19.50
No. 2 machinery cast	15.50 to 16.50
Stove plates	13.50 to 14.00
Railroad malleable	19.00 to 19.50

The following prices are offered per gross ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$12.00 to \$12.50
No. 1 railroad wrought	13.00 to 13.50
No. 1 yard wrought	12.00 to 12.50
Wrought pipe (1 in. in diam., over 2 ft. long)	11.50 to 12.00
Machine shop turnings	9.00 to 9.50
Cast iron borings, chemical	11.00 to 11.50
Cast iron borings, rolling mill.....	8.50 to 9.00
Blast furnace borings and turnings	8.00 to 8.50
Forged scrap	9.50 to 10.50
Bundled skeleton, long	9.50 to 10.00
Forged flashings	10.00 to 10.50
Bundled cotton ties, long	8.75 to 9.25
Bundled cotton ties, short.....	10.00 to 10.50
Shaftings	19.00 to 19.50
Street car axles	18.00 to 18.50
Rails for rerolling	13.00 to 13.50
Scrap rails	12.50 to 13.00

Birmingham

Markets Generally Active—Florida Building Boom Helps Largely

BIRMINGHAM, Sept. 1.—Pig iron for delivery during the fourth quarter is bringing \$19 per ton for No. 2 foundry, Southern furnace companies holding firmly to this base. Small-lot sales have continued steadily for some time, with \$18.50 acceptable for third quarter, but 50c. above that price is asked on future deliveries and no quotation yet stated for next year. Inquiries have been received for first quarter of 1926. Two or three steady melters in this territory do not anticipate interruption to any extent in their operations through the winter. Cast iron pressure pipe makers, in particular, hope that the need for steady production of pipe will keep up. An interesting feature in iron and steel products, as well as clay products being manufactured in the Birmingham district, is that requirements in Florida are strong, and that a large quantity of these articles are being shipped constantly to that territory, and will continue through the winter, as developments are not interrupted by reason of weather. Sales of iron during the past month in this district aggregated greater tonnage than was manufactured. The new month, the last of the third quarter, will see much iron moved, the belief being that through the remainder of the year there will be continued reduction of surplus stocks. Sales during the past month included several orders for a few hundred tons of iron for southern Ohio, to be shipped before the end of the year.

We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 2 foundry, 1.75 to 2.25 sil.....	\$18.50
No. 1 foundry, 2.25 to 2.75 sil.....	19.00
Basic	18.50
Charcoal, warm blast.....	30.00

Finished Steel.—Requirements of the finished steel mills in operation in the Birmingham district are large, absorbing practically all of the crude steel being produced. In some instances, where there is demand for certain shapes in excess of production, warehouse stock is being resorted to. Present activities will hold back further extensions in the finishing line. The Steel Corporation operations are almost at capacity and the Gulf States Steel is operating four open-hearth furnaces. Soft steel bars, Birmingham, are quoted at 2.05c. to 2.15c.

Cast Iron Pipe.—Orders in hand and in sight will warrant active operation of the cast iron pressure pipe plants through the next three months and new business assured will call for pipe making through the winter.

Pipe quotations are strong, minimum \$40 for 6-in. and over pipe.

Coke.—Independent coke producers are finding a good market and production is holding the steady pace noted for several months. Quotations show no change, \$4.50 to \$5 per ton being the range on foundry coke. Federal car service officials belittle reports of car shortage on coal and coke hauling, despite complaint of coal operators.

Old Material.—Despite a steady moving of old material, the market is slow. Quotations remain low and dealers decline long-time contracts. Heavy melting steel is among the products moving steadily, the Tennessee Coal, Iron & Railroad Co.'s recent purchases requiring steady delivery.

We quote per gross ton, f.o.b. Birmingham district yards, as follows:

Cast iron borings, chemical	\$15.00 to \$16.00
Heavy melting steel	13.00 to 14.00
Railroad wrought	12.00 to 13.00
Steel axles	16.00 to 17.00
Iron axles	16.00 to 17.00
Steel rails	13.00 to 14.00
No. 1 cast	16.00 to 16.50
Tramcar wheels	16.50 to 17.00
Car wheels	15.00 to 16.00
Stove plate	13.00 to 13.50
Machine shop turnings	7.00 to 8.00
Cast iron borings	7.00 to 8.00
Rails for rolling	16.50 to 17.00

Buffalo

Increased Pig Iron Inquiries and Prices Firm—Steel Steady

BUFFALO, Sept. 1.—Inquiry for pig iron has increased to a total of 8000 to 10,000 tons, with foundry predominating. Several New England foundries are reported in the market for lots ranging from 600 to 1000 tons and one or two malleable inquiries of like size are reported. Some consumers are asking prices on iron for fourth and first quarter shipment. Makers are in no hurry to quote first quarter prices and some will wait until their coke requirements are covered before quoting, while others offer fourth and first quarter shipments, equally divided, on a \$19 base, and one asks \$19.50 on all first quarter business. Some third quarter purchases have been made at \$18.50 for low silicon foundry, with \$19 sought on small lots. Silicon differentials are in effect nominally, at least. A large consumer may buy iron about Sept. 1, it is reported here. Ten furnaces are in blast, with prospect of an increase to 11 very soon.

We quote prices f.o.b. gross ton, Buffalo, as follows:

No. 2 plain, sil. 1.75 to 2.25	\$18.50 to \$19.00
No. 2X foundry, sil. 2.25 to 2.75	18.50 to 19.00
No. 1 foundry, sil. 2.75 to 3.25	19.00 to 19.50
Malleable, sil. up to 2.25	18.50
Basic	18.50
Lake Superior charcoal	29.28

Finished Iron and Steel.—Prices of most finished materials show steadiness, but reports of shading on others persist. Bars are firm at 2.265c., with shapes quoted at the same price. There are claims of shading on large lots of shapes. Sheet sales continue to be a feature of the finished material market. Some sellers are building up fourth quarter backlogs by quoting 3.15c. on black and 4.20c. on galvanized. Others ask 5c. to 10c. more for sheets for prompt shipment when mill schedules will permit. Plates are dull and are quoted 2.115c. to 2.165c., but 2.065c. is obtainable on desirable tonnages. Iron and steel warehouse business was of good proportions during August and inquiry indicates considerable activity for September. Demand for reinforcing bars for prompt shipment is good. Prices are 2.265c. on mill lots and 2.75c. on stock bars.

Warehouse prices are being quoted as follows: Steel bars, 3.25c.; steel shapes, 3.35c.; steel plates, 3.35c.; No. 10 blue annealed sheets, 3.80c.; No. 28 black sheets, 4.75c.; No. 28 galvanized, 5.45c.; cold rolled shapes, 4.40c.; cold rolled rounds, 3.95c.; wire nails, 4c.; black wire, 4.05c.

Old Material.—Activity is confined largely to buying by dealers. There is no lack of such business and no offerings are going begging. There is good demand for heavy melting steel, with dealers paying \$17.50.

Sales might be made to consumers at \$18 or \$18.25, but dealers believe the next tonnage sales will be at higher prices. Some small lots of malleable and low phosphorus have been sold at advanced prices, but no real tonnages have changed hands to establish a new basic of quotation. Turnings and borings continue active, with sales being made to consumers in Tonawanda, Cleveland and other points. American Brake Shoe is reported to be continuing purchases of stove plate at a price of \$15.25 or \$15.50. Loose and hydraulic bundles are being sold to dealers, but not much tonnage is going to consumers. Dealers predict buying on a good scale soon, but are unable to cite definite inquiries to bear out this prediction.

We quote prices f.o.b. gross ton, Buffalo, as follows:

Heavy melting steel	\$17.50 to \$18.00
Low phosphorus	19.00 to 20.00
No. 1 railroad wrought	16.00 to 16.50
Car wheels	16.50 to 17.50
Machine shop turnings	12.50 to 13.00
Cast iron borings	12.50 to 13.00
No. 1 busheling	15.00 to 15.50
Stove plate	15.25 to 15.50
Grate bars	14.25 to 14.75
Hand bundled sheets	14.00 to 14.50
Hydraulic compressed	16.00 to 16.50
No. 1 machinery cast	16.50 to 17.00
Railroad malleable	19.00 to 19.50
No. 1 cast scrap	17.00 to 17.50
Iron axles	26.00 to 27.00
Steel axles	17.00 to 17.50

St. Louis

Pig Iron Inquiry Strong—Rails Active—Old Material Higher

ST. LOUIS, Sept. 1.—Considerable strength is being shown in the market for pig iron, based on the prospects for increased business during the fourth quarter and the strong position of makers, whose order files are in such excellent shape that they need make no special effort to get new business. Sales of the leading maker during the week were 1500 tons of foundry iron, 600 tons to a St. Louis melter. The principal inquiry before this market is 14,000 tons for the three Western plants of the American Radiator Co., for fourth quarter shipment. The Federal Reserve Bank of St. Louis reports that job foundries and the stove shops increased their working time during the last 30 days and manufacturers of farm implements report a substantial volume of bookings for fall delivery. Prices are unchanged.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices, \$2.16 freight from Chicago, \$5.17 from Birmingham, all rail, and 81c. average switching charge from Granite City.

Northern fdy., sil. 1.75 to 2.25	\$22.66 to \$23.16
Northern malleable, sil. 1.75 to 2.25	22.66 to 23.16
Basic	22.66 to 23.16
Alabama fdy., sil. 1.75 to 2.25	22.67 to 24.17
(rail)	22.67
Tennessee fdy., sil. 1.75 to 2.25	22.31 to 22.81
Granite City iron, sil. 1.75 to 2.25	22.31 to 22.81

Finished Iron and Steel.—The principal business of the week was the award of 2400 tons of reinforcing bars to the Laclede Steel Co. and 1700 tons of sheet piling to the Carnegie Steel Co. for the Stacey Point, St. Louis, municipal waterworks plant. The Texas & Pacific Railway has issued inquiries for 6600 tons of 110-lb. rails and 14,000 tons of 90-lb. rails, for December to May delivery, and it is understood that a larger quantity may be bought. Warehouse business is better than usual at this time of the year, the Illinois coal fields being especially productive now. The Laclede Steel Co. has an order for 70 tons of reinforcing bars for a hotel in Jefferson City, Mo.

For stock out of warehouse we quote: Soft steel bars, 3.15c. per lb.; iron bars, 3.15c.; structural shapes, 3.25c.; tank plates, 3.25c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, cold rolled, one pass, 4.50c.; galvanized sheets, No. 28, 5.50c.; black corrugated sheets, 4.65c.; galvanized, 5.65c.; cold-rolled rounds, shafting and screw stock, 3.70c.; structural rivets, 3.65c.; boiler rivets, 3.85c.; tank rivets, 1/4 in. diameter and smaller, 70 per cent off list; machine bolts, 55 per cent; carriage bolts, 50 per cent; lag screws, 60 per cent; hot pressed nuts, squares, \$3.50; hexagons, blank or tapped, \$4 off list.

Coke.—The Granite City by-product producer has increased the price of domestic grades 25c. a ton, effective Sept. 1, and reports increasing interest in this fuel. Shipments of foundry coke have been heavy during the month.

Old Material.—The market for old materials is higher and stronger, due to keen competition of dealers for material to lay down in their yards in anticipation of higher prices, rather than to a demand from consumers. There is little buying by consumers in the district, but dealers believe that there will be a buying movement soon, especially as inquiries are being made for most items except cast iron, the price of which consumers say is too close to that of pig iron to warrant its profitable use. Railroad lists have been bringing good prices. New lists include: Louisville, Henderson & St. Louis, 2000 tons (relaying rails); Big Four, 2400 tons; Standard Oil of Indiana at Wood-river, Ill., 250 tons; Missouri Pacific, 3500 tons; Pennsylvania System, 32,000 tons; Chicago, Milwaukee & St. Paul, 5700 tons; Wabash, 225 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	\$15.00 to \$15.50
Rails for rolling	20.00 to 20.50
Steel rails less than 3 ft.	19.00 to 19.50
Relaying rails, 60 lb. and under	24.00 to 25.00
Relaying rails, 70 lb. and over	31.00 to 33.00
Cast iron car wheels	18.50 to 19.00
Heavy melting steel	15.50 to 16.00
Heavy shoveling steel	15.50 to 16.00
Frogs, switches and guards cut apart	19.00 to 19.50
Railroad springs	19.50 to 20.00
Heavy axles and tire turnings	12.00 to 12.50
No. 1 locomotive tires	17.50 to 18.00
Per Net Ton	
Steel angle bars	16.00 to 17.00
Steel car axles	19.00 to 19.50
Iron car axles	25.00 to 25.50
Wrought iron bars and transoms	19.00 to 19.50
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	13.75 to 14.75
Cast iron borings	10.75 to 12.25
No. 1 busheling	11.50 to 12.00
No. 1 railroad cast	15.50 to 16.00
No. 1 machinery cast	17.00 to 17.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	8.00 to 8.50
Champion bundled sheets	9.25 to 9.75

Cincinnati

Half of Fourth Quarter Iron Sold— August Big Steel Month

CINCINNATI, Sept. 1.—Pig iron buyers are displaying slight interest, with the result that the local market is dormant. Despite the indifference of consumers, prices are steadily gaining in strength. Although Northern iron for immediate delivery can be purchased at \$19.50 furnace, in the Ironton district, sellers are disposing of lots for fourth quarter shipment at \$20. With production in southern Ohio, aside from the silvery furnaces, at a standstill, it is anticipated that the \$19.50, Ironton, price will disappear in the immediate future. Lake interests are proving to be an important factor in this territory. The largest sale of the past week, that of 1800 tons of foundry iron to a Springfield, Ohio, melter, is reported to have been taken by a Cleveland furnace. A local dealer booked 750 tons of malleable from a northern Ohio consumer. Sales of Alabama iron have been negligible, aside from 600 tons contracted for by a southern Ohio melter. Spot business is bringing out a price of \$18.50, Birmingham, but \$19 is the minimum figure for fourth quarter orders, according to furnace representatives. Several Alabama producers are asking \$20 to \$21, Birmingham, thereby virtually eliminating themselves from this market. Tennessee iron activities have been dormant, and the \$17.50, Birmingham, quotation is unchanged. Inquiries are limited. The largest calls for 500 to 1000 tons of low phosphorus iron for an Indiana melter. Others include 250 to 500 tons of foundry for a central Ohio melter, 300 tons of malleable for a

northern Ohio consumer and an unstated lot, estimated at 500 tons, for a local melter. Sellers believe that about one half of the consumers in this territory have covered their fourth quarter requirements. Sales in the past week aggregated 6000 tons.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton we quote f.o.b. Cincinnati:

Alabama, fdy. sil. 1.75 to 2.25	
(base)	\$22.55 to \$23.05
Alabama fdy., sil. 2.25 to 2.75	23.05 to 23.55
Tennessee fdy., sil. 1.75 to 2.25	21.55
Southern Ohio silvery, 8 per cent	28.27
Southern Ohio fdy., sil. 1.75 to 2.25	21.77 to 22.27
Southern Ohio, malleable	21.27 to 21.77

Bars, Shapes and Plates.—Sales the past week fell short of the mark attained the previous week, but were large enough to enable the total business for August to compare favorably with the best month of the year to date. The market on bars has settled to 1.90c., Pittsburgh. Small tonnages are being taken at 2c., Pittsburgh, and the price on single carloads is expected to remain at this level. Buying, while heavy, has been confined to tonnages for immediate use. The price of shapes varies from 1.90c. to 2c., Pittsburgh. Demand for plates is not active, but bookings are of fair volume. Quotations of 1.85c., Pittsburgh, are being made on current business. Activities of fabricators are gaining and there is more structural work pending than for several months past.

Sheets.—August sales will, in most cases, about equal those of July. The market is gradually accumulating strength and the trend of production is upward. Mills report future commitments sufficient to keep them operating at 75 per cent of capacity. Buyers are refusing to interest themselves in orders beyond those for prompt shipment. Galvanized sheets are in considerable demand and are quoted at 4.30c., Pittsburgh, though some sellers are said to be shading this price. Black sheets are firm at 3.15c., Pittsburgh, while blue annealed is steady at 2.30c. Demand for auto sheets is limited. They are bringing 4.25c., Pittsburgh. Sellers have opened their books for the fourth quarter, but they are not seeking business too far ahead because of the possibility of an upward price turn.

Reinforcing Bars.—The Pollak Steel Co. has taken 200 tons for the new municipal reservoir at Dayton, Ohio. Bids are in on 120 tons for the Sun Rise Avenue bridge in that city. No sizable jobs are in immediate prospect and sellers are concentrating their efforts upon numerous small lettings. New billet bars are firm at 2c. to 2.10c., mill, while rail steel bars are quoted at 1.90c., mill.

Warehouse Business.—The volume of business during August has paralleled that of July, according to local jobbers. This fact is a source of gratification, because usually August proves to be an off month. Increased sales of structural shapes and plates, sheets and pipe have accounted for the good showing. Slightly improved demand for wire goods has been manifested by consumers. Prices remain firm and there are no indications of changes in the immediate future.

Cincinnati jobbers quote: Iron and steel bars, 3.30c.; reinforcing bars, 3.30c.; hoops, 4c. to 4.25c.; bands, 3.95c.; shapes, 3.40c.; plates, 3.40c.; cold-rolled rounds and hexagons, 3.85c.; squares, 4.35c.; open-hearth spring steel, 4.75c. to 5.75c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.10c.; No. 28 galvanized sheets, 5.25c.; No. 9 annealed wire, \$3 per 100 lb.; common wire nails, \$2.95 per keg base; cement coated nails, \$2.40 per keg; chain, \$7.55 per 100 lb. base; large round head rivets, \$3.75 base; small rivets, 65 per cent off list. Boiler tubes: prices net per 100 ft. lap welded steel tubes, 2-in., \$18; 4-in., \$38; seamless, 2-in., \$19; 4-in., \$39.

Wire Goods.—A fair sprinkling of orders for prompt shipment has been booked. The frequency of purchases, together with the demand for quick delivery, implies that stocks of consumers are depleted and that buyers are contented to have only sufficient tonnage on hand to fill immediate needs. Call for fencing is slowly improving, but farmers are expected to postpone considerable replacement work until next spring rather than attempt it this fall. Current business is not of the

kind that seriously tests prices. Eastern mills name 2.65c., Cleveland, as their price on common wire nails, but independent mills in Iron-ton territory persist in going below this figure. Plain wire is showing more stability at 2.50c., Cleveland. The Big Four Railroad will take bids until Sept. 8 on 400,000 galvanized tie dating nails.

Coke.—The tie-up of anthracite coal mining activities has stimulated the sales of domestic coke, which totaled more than 4000 tons the past week. Domestic coke prices have responded to the increased demand and advances range from 25c. to \$1 a ton. By-product coke producers have announced that their price on foundry coke will remain at the present level during September. A sale of 1500 tons of foundry coke for shipment in the next four months is noted. Shipments of domestic grades in August registered a considerable increase over those of July.

Old Material.—Mill buying has been disappointing to dealers, who had anticipated early entry of steel companies into the scrap market. One large mill has held up shipments, while other plants have liberal stocks to call upon and will not be in need of further material for some time. The Big Four Railroad is closing today with a list totaling 2400 tons, of which 700 tons consists of heavy melting steel. Prices have not been affected by the slackening off of activities and heavy melting steel is firm at \$15 to \$15.50.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

	Per Gross Ton	
Heavy melting steel	\$15.00 to \$15.50	
Scrap rails for melting	14.50 to 15.00	
Short rails	18.50 to 19.00	
Relaying rails	28.00 to 28.50	
Rails for rolling	15.50 to 16.00	
Old car wheels	14.00 to 14.50	
No. 1 locomotive tires	17.00 to 17.50	
Railroad malleable	16.00 to 16.50	
Agricultural malleable	15.50 to 16.00	
Loose sheet clippings	10.50 to 11.00	
Champion bundled sheets	12.00 to 12.50	
	Per Net Ton	
Cast iron borings	9.00 to 9.50	
Machine shop turnings	8.00 to 8.50	
No. 1 machinery cast	19.00 to 19.50	
No. 1 railroad cast	15.50 to 16.00	
Iron axles	23.00 to 23.50	
No. 1 railroad wrought	12.00 to 12.50	
Pipes and flues	9.00 to 10.00	
No. 1 busheling	11.00 to 11.50	
Mixed busheling	9.50 to 10.00	
Burnt cast	10.00 to 10.50	
Stove plate	11.00 to 11.50	
Brake shoes	11.00 to 11.50	

Canadian Scrap Market Stagnant

TORONTO, ONT., Sept. 1.—August proved a dull period in the iron and steel scrap market. The iron and steel industry has been depressed throughout the greater part of the year so that consumers of iron and steel scrap have been purchasing on a scale of about 50 per cent of that of a year or two ago. The chief topic of conversation among Canadian business men is whether or not there will be a general election this year; practically all are of the opinion that, until a new government has been elected and assurance is given of a stable tariff policy, there is little prospect of much improvement in the iron and steel industry.

The two large steel works at Sydney, N. S., and at Sault Ste. Marie, Ont., have been in full operation for only about three months this year and at present they are running only in a very limited way. There are but three blast furnaces blowing in Canada out of 16. Of the three one was blown in by the British Empire Steel Corporation on Aug. 24, to make foundry iron. The Algoma Steel Corporation, Sault Ste. Marie and the Steel Co. of Canada, Hamilton, Ont., each has a furnace blowing. United States buyers are also showing interest in this market. Canadian pig iron prices are unchanged but show a firmer tendency. Dealers' buying prices are:

	Gross Tons	Toronto	Montreal
Steel turnings	\$9.50	\$8.00	
Machine shop turnings	9.50	8.00	
Wrought pipe	7.00	8.00	
Rails	11.00	12.00	
No. 1 wrought scrap	12.00	13.00	
Heavy melting steel	11.00	11.00	
Steel axles	17.00	18.00	
Axles, wrought iron	18.00	20.00	
	Net Tons		
Standard car wheels	15.00	15.00	
Malleable scrap	13.00	13.00	
Stove plate	13.00	13.00	
No. 1 machinery cast	16.00	16.00	

Cleveland

Pig Iron Active—Finished Steel Firmer on Improved Buying

CLEVELAND, Sept. 1.—The finished steel market shows a firmer tone, particularly on steel bars. One leading producer is now holding firmly to 2c. for steel bars, at which most of the business in this territory is being placed. The volume of sales improved considerably during the week. Consumers are showing more of a disposition to buy for stock, and quite a number of inquiries came out for the fourth quarter for steel bars, plates and structural material. A leading producer reports a 25 per cent gain in orders entered in this territory in August over July, making August the best month since March. The price range on plate is unchanged at 1.80c. to 1.90c., with the latter more common in this territory. However, close buyers are able to place small lots at 1.80c. Structural material ranges from 1.90c. to 2c. Considerable new business in steel bars, sheets and strip steel is coming from the automotive industry. This seems to show no letup, and some of the leading Detroit car builders expect to break all production records for the year in September. The Chesapeake & Ohio Railroad is inquiring for 50 heavy Mikado type locomotives, making with the New York Central and other recent inquiries 145 locomotives pending. An Ohio railroad is inquiring for 3500 to 4000 tons of rails. The Bethlehem Steel Co. has taken 1100 tons of sheet steel piling for a Cleveland filtration plant. The Henry Vogt Machine Co., Louisville, Ky., has taken 20 stills, requiring 500 tons of plates which have been placed with an Eastern mill. Little new inquiry is coming out in the structural field.

Jobbers quote steel bars, 3.10c.; plates and structural shapes, 3.20c.; No. 28 black sheets, 3.90c.; No. 28 galvanized sheets, 5.10c.; No. 10 blue annealed sheets, 3.10c.; cold-rolled rounds and hexagons, 3.80c.; flats and squares, 4.30c.; hoops and bands, 3.85c.; No. 9 annealed wire, \$3 per 100 lb.; No. 9 galvanized wire, \$3.45 per 100 lb.; common wire nails, \$3 base per 100 lb.

Pig Iron.—The market continues fairly active. Cleveland interests during the week sold 30,000 tons of foundry and malleable iron, mostly for the last quarter, although some small lots were for prompt shipment. The American Radiator Co. came into the market during the week and is reported to have purchased more than 40,000 tons of iron for the fourth quarter. This business included 9000 tons for Detroit and 1500 tons for Springfield, Ohio. Prices are unchanged from a week ago. One local interest is meeting the \$18.50 Valley price by selling iron for shipment from Cleveland on an \$18.50 Valley base. For Cleveland delivery \$19.50 at furnace is still the ruling price. A Detroit producer that advanced its price to \$21 a week ago has made small lot sales at that price, but, generally speaking, this advance has put this producer out of the market at present, as another Lake furnace interest is still quoting \$20 in the Michigan territory. For delivery in western Ohio and eastern Indiana the ruling price is \$19.50. The attitude of some sellers is against price advances. Some further inquiries have come out for first quarter iron, but no sales have been made as yet. Basic iron is unchanged at \$18 Valley, but it is claimed that not much can be purchased at that price. Tonnage booked in August showed a gain over July. Shipments also showed some increase over the previous month.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and \$6 from Birmingham:

Basic, Valley furnace	\$18.00
Nth'n No. 2 fdy., sil. 1.75 to 2.25	20.00
Southern fdy., sil. 1.75 to 2.25	\$23.51 to 26.01
Malleable	20.00
Ohio silvery, 8 per cent	29.02
Standard low phos., Valley furnace	27.50 to 28.00

Semi-Finished Steel.—Several inquiries for sheet bars for the fourth quarter, aggregating 30,000 tons, have come out. Some mills are still asking \$15, Youngstown, although the only recent sale reported was made at \$33.50, Youngstown, in the form of a readjustment

of an old contract, and that price is regarded as more representative of the market. Billets and slabs are quoted at a range of \$33.50 to \$35, Youngstown.

Sheets.—The sheet market shows a firmer tendency, and the volume of business has improved. On black sheets 3.10c. has not disappeared, and some business was taken during the week as low as 3.05c. However, the market has been fairly well established at 3.15c., and there are fewer attempts by buyers to break the price than heretofore. Blue annealed sheets are now holding fairly well to 2.30c., although some of the mills are still going to 2.25c. Some inquiries for fourth quarter contracts are coming out, and on these some of the mills are quoting 3.15c. for black and 4.30c. for galvanized. Auto body sheets are firm at 4.25c.

Hot and Cold Rolled Strip Steel.—The market on hot-rolled strip steel is holding closely to 2.20c. for wide material and 2.40c. for narrow strip, although occasionally a large buyer is able to secure some concessions. Cold rolled strip is firm at 3.75c. The demand is holding up well, and mills are comfortably filled with orders.

Reinforcing Bars.—Rerolling mills are taking a firmer stand on prices, owing to the advance on old rails. The usual quotation on rail steel bars is 1.80c., although 1.75c. has not disappeared for an attractive order. Small lots are in good demand.

Bolts, Nuts and Rivets.—The demand for bolts and nuts shows some gain in the past week over earlier in the month. Good specifications are coming from the automotive industry. Prices are firm. Rivets are quiet.

Coke.—Prices on foundry coke have been further advanced 50c. to 75c. a ton as a result of discounting the effects of a hard coal strike, and the demand has increased as the advance in prices is causing some consumers to buy for stock. While some grades of standard Connellsville foundry coke may still be had at \$4.50, the common range of prices is now \$4.75 to \$5.25.

Old Material.—The market is virtually at a standstill, with a deadlock between consumers and dealers. Mills will not pay the price dealers are asking, and the latter show no inclination to shade quotations to effect sales. One local consumer is offering \$13 for machine shop turnings and some of the dealers are asking as high as \$16 for this grade.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel	\$17.00 to \$17.50
Rails for rolling	17.00 to 17.50
Rails under 3 ft.	19.00 to 19.50
Low phosphorus melting	18.00 to 18.25
Cast iron borings	14.00 to 14.50
Machine shop turnings	14.00 to 14.50
Mixed borings and short turnings	14.00 to 14.50
Compressed sheet steel	15.75 to 16.00
Railroad wrought	13.50 to 14.00
Railroad malleable	18.50 to 19.00
Light bundled sheet stampings	12.25 to 12.75
Steel axle turnings	15.50 to 16.00
No. 1 cast	18.00 to 18.50
No. 1 busheling	14.25 to 14.75
Drop forge flashings	13.00 to 13.50
Railroad grate bars	13.50 to 13.75
Stove plate	13.50 to 13.75
Pipes and flues	12.00 to 12.25

September Promising in Detroit District

DETROIT, Sept. 1.—Automobile production schedules for September are on a par with those of August and with radiator manufacturers operating at capacity and stove and furnace plants increasing their melt, September promises to be a high month for tonnage melting figures for the year. The offerings of the largest scrap producers in the district, which are heavy, are being moved on current orders.

The following prices are quoted on a gross ton basis f.o.b. producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting and shoveling steel	\$14.50 to \$15.00
Borings and short turnings	11.75 to 12.25
Long turnings	11.25 to 11.75
No. 1 machinery cast	15.00 to 16.00
Automobile cast	21.00 to 22.00
Hydraulic compressed	13.75 to 14.25
Stove plate	12.50 to 13.00
No. 1 busheling	12.75 to 13.25
Sheet clippings	9.00 to 10.00
Flashings	12.00 to 12.50

Philadelphia

Coal Strike Has Slight Effect, If Any, in Iron and Steel Trade

PHILADELPHIA, Sept. 1.—The anthracite coal strike caused scarcely a ripple in the iron and steel trade except for a further strengthening of coke prices. Blast furnace coke has been sold at \$3.40, Connellsville, for spot shipment. There is less coke to be had for September. In the opinion of the trade here the coal strike will not have any important influence on prices or market conditions for a few weeks at least, but the possibility of trouble in the bituminous fields is the most serious phase of the outlook.

While August steel business quite generally showed a gain over July, the character of business has not changed, it being made up of a great many small orders, the principal exceptions being in structural steel. There was one good tonnage of this kind during the week, namely 12,000 tons for the Broad Street subway, which will be fabricated by the McClintic-Marshall Co. The steel price situation has shown little or no change within the week, and while prices of some products continue weak, there is a degree of satisfaction among the mills that the weakness has not been more pronounced. Sellers are making continued efforts to stiffen prices, particularly of plates, shapes, bars and sheets, but concessions continue to appear.

Old material shows renewed strength, with an advance of 50c. a ton on heavy melting steel. Pig iron remains firm at \$20.50, base, for foundry grades. Sales during the week have been fairly substantial, totaling 30,000 tons or more.

Pig Iron.—The American Radiator Co. has closed for 10,000 tons of foundry iron for its plant at Bayonne, N. J., and most, if not all, of this will be furnished by eastern Pennsylvania furnaces. The J. L. Mott Iron Works, Trenton, N. J., bought about 2500 tons. There was another large sale of foundry iron, on which details are withheld. On the smaller transactions of the week the foundry iron market has held firmly at \$20.50, furnace, for No. 2 plain and at \$21, furnace, for No. 2X. Whether concessions were given on the larger sales noted above was not made known. On at least a part of the Mott business \$20.50, furnace, was paid for the base grade. Some foreign iron at \$20.25, Philadelphia, was bought. Sales aggregating about 1500 tons of copper bearing low phosphorus iron brought no change in price. The principal basic users of this district are well covered for the immediate future and there is no active interest in basic at present.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to \$1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$21.26 to \$21.63
East. Pa. 2X, 2.25 to 2.75 sil.	21.76 to 22.13
East. Pa. No. 1X	22.26 to 22.63
Virginia No. 2 plain, 1.75 to 2.25 sil.	28.67 to 29.17
Virginia No. 2X, 2.25 to 2.75 sil.	29.17 to 29.67
Basic delivery eastern Pa.	20.50 to 21.50
Gray forge	21.00 to 22.00
Malleable	22.00 to 22.50
Standard low phos. (f.o.b. furnace)	22.00 to 23.00
Copper bearing low phos. (f.o.b. furnace)	22.50 to 23.50

Ferroalloys.—Moderate-size lots of ferromanganese are being sold at \$115, seaboard or furnace.

Billets.—Some mills continue to quote \$35, Pittsburgh, for rerolling billets and \$40 for forging billets, but this latter price is said to have been shaded on about 500 tons bought last week by a local manufacturer.

Plates.—A majority of plate sales are at 1.80c., Pittsburgh, but occasional sales are being made at 1.75c. and even 1.70c. has been met. These lower prices, however, are more frequent in New York than in the Philadelphia district. Some mills report a slight gain in orders.

Structural Material.—Plain material prices continue weak. While most of the sales are at 1.90c., Pittsburgh, there is cutting on desirable orders of at least \$1 and occasionally \$2 a ton. Not all mills, however, are making these concessions.

Bars.—The 1.90c. price on bars is becoming more general, and in fact is now being given to most of the larger buyers, which includes the railroads and the jobbers. A good many of the smaller orders are being booked at 2c., Pittsburgh. Demand is fairly good. Bar iron is quoted by Eastern mills at 2.12c. to 2.22c., Philadelphia.

Sheets.—A few sales of blue annealed sheets have been made at 2.20c., Pittsburgh, but the bulk of the week's business was at 2.25c. and 2.30c. Galvanized sheets are holding fairly well at 4.20c. to 4.30c., with black sheets at 3.15c. to 3.20c., Pittsburgh.

Imports.—Receipts at this port last week were as follows: Pig iron from India, 1007 tons; iron ore from Sweden, 7310 tons; structural steel from Luxemburg, 292 tons; steel blooms from France, 618 tons.

Old Material.—The Eastern scrap market has strengthened considerably in the past week. The Bethlehem Steel Co. has paid \$17 for heavy melting steel for delivery at Bethlehem and \$16.50 for delivery at Sparrows Point, but the latter transaction has only an incidental effect on the eastern Pennsylvania situation. The Worth Steel Co., after trying to buy at \$17, paid \$17.50 for 3000 to 5000 tons. Other mills have tried unsuccessfully to buy at \$17. In the case of the Worth Steel Co. purchases no broker could be found who was willing to sell a large tonnage at \$17.50, and most of the orders ranged from 200 to 500 tons. The selling ideas of brokers are \$18 or higher, and the mills are of the belief that the market has advanced more rapidly than has been justified by conditions. Scrap brokers have been appealed to by some of the mills to keep prices within bounds because of the low prices at which finished steel products are being sold. The "bullish" attitude on scrap extends down to the smallest yard dealer, and brokers are finding it difficult to buy to cover their orders.

We quote for delivery, consuming points in this district, as follows:

No. 1 heavy melting steel.....	\$17.00 to \$17.50
Scrap rails	17.00 to 17.50
Steel rails for rolling.....	18.50 to 19.00
No. 1 low phos. heavy 0.04 and under	22.00 to 22.50
Couplers and knuckles.....	21.50 to 22.00
Roller steel wheels.....	21.50 to 22.00
Cast iron car wheels.....	18.50 to 19.00
No. 1 railroad wrought.....	17.50 to 18.50
No. 1 yard wrought.....	17.00 to 17.50
No. 1 forge fire.....	15.00 to 15.50
Bundled sheets (for steel works)	14.00 to 14.50
Mixed borings and turnings (for blast furnace use).....	13.00 to 13.50
Machine shop turnings (for steel works use)	14.00 to 14.50
Machine shop turnings (for rolling mill use).....	14.50 to 15.00
Heavy axle turnings (or equivalent)	15.50 to 16.00
Cast borings (for steel works and rolling mill).....	14.00
Cast borings (for chemical plant)	16.00 to 16.50
No. 1 cast.....	18.00 to 18.50
Heavy breakable cast (for steel plants)	17.00 to 17.50
Railroad grate bars.....	15.00
Stove plate (for steel plant use)	15.00
Wrought iron and soft steel pipes and tubes (new specifications)	16.50 to 17.00
Shafting	24.00 to 25.00
Steel axles	24.50 to 25.00

Warehouse Business.—Efforts of Philadelphia jobbers to obtain what they consider a proper differential over mill prices on various steel products have been partially successful. Bars are selling at 3.20c., but plates and shapes are not higher. Sales of shapes have been made as low as 2.73c. A change has been made in the method of quoting to out-of-town customers. On bars for shipment to Reading, for example, the quotation would be 2.90c., Pittsburgh, with the less-than-carload freight of 37½c. per 100 lb. added, making the delivered price at Reading 3.27½c. This is in effect a substantial advance over the prices which have re-

cently obtained on out-of-town shipments. We quote for local delivery as follows:

Soft steel bars and small shapes, 3.20c.; iron bars (except bands), 3.20c.; round edge iron, 3.50c.; round edge steel, iron finished, 1½ x ½ in., 3.50c.; round edge steel planished, 4.30c.; tank steel plates, ¼ in. and heavier, 2.80c. to 3c.; tank steel plates, ¾ in., 3c.; blue annealed steel sheets, No. 10 gage, 3.35c.; black sheets, No. 28 gage, 4.35c.; galvanized sheets, No. 28 gage, 5.45c.; square, twisted and deformed steel bars, 3c.; structural shapes, 2.75c. to 2.90c.; diamond pattern plates, ¼-in., 5.30c.; ⅜-in., 5.50c.; spring steel, 5c.; rounds and hexagons, cold-rolled steel, 4c.; squares and flats, cold-rolled steel, 4.50c.; steel hoops, 4.25c. base; steel bands, No. 12 gage to ⅜ in., inclusive, 3.90c.; rails, 3.20c.; tool steel, 8.50c.; Norway iron, 6.50c.

Change in Trumbull Steel Management

(Concluded from page 630)

the Midland preferred stockholders and leaving about \$1,000,000 of working capital for the new company.

The Trumbull Steel Co., according to its May 31 balance sheet, has assets of \$56,504,214 after giving effect to the issue of debentures. The Otis Steel Co. has \$34,117,474 in assets and the Midland Steel Products Co. \$13,001,660 in assets according to their statements of Dec. 31, 1924.

The Trumbull Steel Co., organized in 1912 by Jonathan Warner, who has been its president since that time, manufactures sheets, tin plate and hot and cold rolled strip steel. The plant includes seven basic open hearth furnaces, blooming and bar mills, 19 tin plate mills, 13 sheet mills, two jobbing mills, three hot strip mills and 48 cold strip mills. It also owns the Liberty Steel Co., Warren, having ten black plate mills and cold mills. The annual finished steel capacity of the Trumbull company, including its Liberty plant, is 361,000 tons of hot and cold rolled strip, 120,000 tons of sheets and 119,000 tons of tin plate.

The Trumbull Steel Co., in addition to owning one-half interest in the Trumbull Cliffs Furnace Co., owns one-half of the capital stock of the Trumbull Coal Co., owning large coal reserves in Greene County, Pa., and one-fourth interest in the capital stock of the Mesaba Cliffs Iron Mining Co., which controls large reserves of ore in the Mesaba range. This is one of the Cleveland Cliffs Iron Co.'s iron mine companies.

The property of the Otis Steel Co. includes its Lakeside and Riverside Works in Cleveland. The Riverside plant has two blast furnaces, four open-hearth furnaces, a 40-in. blooming mill, a 24-in. sheet bar mill, sheared plate mill, four jobbing plate mills, 8 sheet mills, a 20-in. hot strip mill and 20 stands of cold rolls. At its Lakeside Works are eight open-hearth furnaces, a blooming mill, two sheared plate mills and a steel foundry. The rated annual capacity of the Otis Steel Co. in finished material is 240,000 tons of plates, 72,000 tons of blue annealed sheets, 60,000 tons of auto body sheets, 144,000 tons of hot rolled strip steel and 48,000 tons of cold rolled strip steel.

The annual steel consumption of the Midland Steel Products Co. in both its Cleveland and Detroit Plants is 140,000 to 150,000 tons, largely in plates and hot rolled strip steel.

Statement of E. J. Kulas

"Ever since I have been with the Otis Steel Co. I have had my eye out for a consolidation that would effect economies for the Otis company," said Mr. Kulas in discussing the proposed merger. "The Trumbull Steel Co. plant is the last word in the manufacture of tin plate, and as there is very little overlapping between Trumbull and Otis, I have thought that a Trumbull-Otis combination would prove advantageous to all concerned. A merger of steel companies opens the way for a tremendous saving of overhead.

"By combining these steel companies the business could be run with practically the same executive force, the elimination of some of the offices, while one engineering staff, one accounting force and one selling organization would be able to do what now requires three."

Prices of Finished Iron and Steel Products (Carload Lots)

Tank Plates

F.o.b. Pittsburgh mill, base, per lb.....1.80c. to 1.90c.
F.o.b. Chicago, base, per lb.....2.10c.

Structural Shapes

F.o.b. Pittsburgh mill, base, per lb.....1.90c. to 2c.
F.o.b. Chicago, base, per lb.....2.10c.

Iron and Steel Bars

Soft steel bars, f.o.b. P'gh mills, base, per lb....1.90c. to 2c.
Soft steel bars, f.o.b. Chicago, base, per lb.....2.10c.
Reinforcing steel bars, f.o.b. P'gh mills, per lb....1.90c. to 2c.
Rail steel bars, f.o.b. Chicago and f.o.b. Chicago district mills, base, per lb.....2.00c.
Common iron bars, f.o.b. Chicago, base, per lb....1.90c. to 2.00c.
Refined iron bars, f.o.b. P'gh mills, base, per lb.....3.00c.
Common iron bars, eastern Pa. mill, base, per lb.....2.10c.

Hot-Rolled Flats

Hoops, base (6 in. and narrower), per lb., Pittsburgh..2.40c.
Bands, base (6 in. and narrower), per lb., Pittsburgh..2.40c.
Strips, 6 in. and narrower, base, per lb., Pittsburgh..2.40c.
Strips, wider than 6 in., base, per lb., Pittsburgh..2.20c.
Strips, 6 in. and narrower, Chicago.....2.40c. to 2.50c.
Strips, wider than 6 in., Chicago.....2.30c. to 2.40c.
Cotton ties, per 45 lb. bundle, f.o.b. Atlantic ports.....\$1.28
Cotton ties, per 45 lb. bundle, f.o.b. Gulf ports.....1.25

Cold-Finished Steel

Screw stock and shafting, f.o.b. P'gh mills, base, per lb..2.50c.
Screw stock and shafting, f.o.b. Chicago, base, per lb..2.50c.
Screw stock, base, per lb., Cleveland.....2.55c.
Shafting, ground, f.o.b. mill, base, per lb.....2.80c. to 3.00c.
Strips, f.o.b. P'gh mills, base, per lb.....3.75c.
Strips, f.o.b. Cleveland mills, base, per lb.....3.75c.
Strips, f.o.b. delivered Chicago, base, per lb.....4.05c.
Strips, f.o.b. Worcester mills, base, per lb.....3.90c.

Wire Products

(To jobbers in car lots f.o.b. Pittsburgh and Cleveland)

Nails, base, per keg.....\$2.65
Galvanized nails, 1-in. and longer, base plus.....2.00
Galvanized nails, shorter than 1 in., base plus.....2.25
Bright plain wire, base, No. 9 gage, per 100 lb.....2.50
Annealed fence wire, base, per 100 lb.....2.65
Spring wire, base, per 100 lb.....3.50
Galvanized wire, No. 9, base, per 100 lb.....3.10
Galvanized barbed, base, per 100 lb.....3.35
Galvanized staples, base, per keg.....3.35
Painted barbed wire, base, per 100 lb.....3.10
Polished staples, base, per keg.....3.10
Cement coated nails, base, per count keg.....1.85
*Bale ties, carloads, to jobbers...75, 15 and 5 per cent off list
*Bale ties, carloads, to retailers...75, 10 and 6 per cent off list
Woven wire fence, base, per net ton to retailers.....\$65
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass. mill \$3 a ton higher on production of that plant, and Duluth, Minn., mills \$2 a ton higher; Anderson, Ind., \$1 higher.

*F.o.b. Cleveland.

Sheets

Blue Annealed
(base) per lb.

Nos. 9 and 10, f.o.b. Pittsburgh.....2.25c. to 2.30c.
Nos. 9 and 10 (base) per lb., f.o.b. Chicago dist. mills, 2.40c. to 2.45c.

Box Annealed, One Pass Cold Rolled

No. 28 (base) per lb., f.o.b. Pittsburgh.....3.10c. to 3.20c.
No. 28 (base) per lb., f.o.b. Chicago dist. mill..3.30c. to 3.35c.

Galvanized

No. 28 (base) per lb., f.o.b. Pittsburgh.....4.20c. to 4.30c.
No. 28 (base) per lb., f.o.b. Chicago dist. mill..4.35c. to 4.40c.

Tin-Mill Black Plate

No. 28 (base) per lb., f.o.b. Pittsburgh.....3.10c. to 3.20c.
No. 28 (base) per lb., f.o.b. Chicago dist. mill..3.25c. to 3.40c.

Automobile Body Sheets

No. 22 (base) per lb., f.o.b. Pittsburgh.....4.25c.

Long Ternes

No. 28 (base) 8-lb. coating, per lb., f.o.b. mill..4.60c. to 4.75c.

Tin Plate

Standard cokes, per base box, f.o.b. Pittsburgh district mills.....\$5.50
Standard cokes, per base box f.o.b. Chicago district mills 5.60
Standard cokes, per base box f.o.b. Elwood, Ind.....5.60

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating, 100 lb. base.....\$11.20	20-lb. coating I. C.....\$15.50
8-lb. coating I. C.....11.50	25-lb. coating I. C.....17.00
15-lb. coating I. C.....14.35	30-lb. coating I. C.....18.35
	40-lb. coating I. C.....20.35

Rivets

Large, f.o.b. P'gh and Cleveland mills, base, per 100 lb.....\$2.40 to \$2.50
Large, f.o.b. Chicago, base, per 100 lb.....2.50 to 2.60
Small, f.o.b. Pittsburgh.....70, 10 and 5 per cent off list
Small, Cleveland.....70 and 10 to 70, 10 and 10 per cent off list
Small, Chicago.....70, 10 and 5 per cent off list

Rails and Track Equipment

(F.o.b.)

Rails, standard, per gross ton.....\$43.00
Rails, light, billet, base, per lb.....1.60c. to 1.70c.
Rails, light rail steel, base, per lb.....1.50c. to 1.60c.
Spikes, $\frac{3}{4}$ in. and larger, base, per 100 lb.....\$2.80 to \$3.00
Spikes, $\frac{1}{2}$ in. and smaller, base, per 100 lb.....3.00 to 3.25
Spikes, boat and barge, base, per 100 lb.....3.25
Track bolts, all sizes, base, per 100 lb.....3.90 to 4.25
Tie plates, per 100 lb.....2.35 to 2.40
Angle bars, base, per 100 lb.....2.75

Welded Pipe

(F.o.b. Pittsburgh district mills)

Butt Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
$\frac{1}{8}$	45	19 $\frac{1}{2}$	$\frac{1}{4}$ to $\frac{3}{8}$	+11	+39
$\frac{1}{4}$	51	25 $\frac{1}{2}$	$\frac{1}{2}$	22	2
$\frac{3}{8}$	56	42 $\frac{1}{2}$	$\frac{3}{4}$	28	11
$\frac{1}{2}$	60	48 $\frac{1}{2}$	1 to 1 $\frac{1}{2}$	30	13
1 to 3.....	62	50 $\frac{1}{2}$			

Lap Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
2.....	55	43 $\frac{1}{2}$	2.....	23	7
$2\frac{1}{2}$ to 6.....	59	47 $\frac{1}{2}$	$2\frac{1}{2}$	26	11
7 and 8.....	56	43 $\frac{1}{2}$	3 to 6.....	28	13
9 and 10.....	54	41 $\frac{1}{2}$	7 to 12.....	26	11
11 and 12.....	53	40 $\frac{1}{2}$			

Butt Weld, extra strong, plain ends

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
$\frac{1}{8}$	41	24 $\frac{1}{2}$	2 to 3.....	61	50 $\frac{1}{2}$
$\frac{1}{4}$ to $\frac{3}{8}$	47	30 $\frac{1}{2}$	$\frac{1}{4}$ to $\frac{3}{8}$	+11	+54
$\frac{1}{2}$	53	42 $\frac{1}{2}$	$\frac{1}{2}$	21	7
$\frac{3}{4}$	58	47 $\frac{1}{2}$	$\frac{3}{4}$	28	12
1 to 1 $\frac{1}{2}$	60	49 $\frac{1}{2}$	1 to 1 $\frac{1}{2}$	30	14

Lap Weld, extra strong, plain ends

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
2.....	53	42 $\frac{1}{2}$	2.....	23	9
$2\frac{1}{2}$ to 4.....	57	46 $\frac{1}{2}$	$2\frac{1}{2}$ to 4.....	29	15
$4\frac{1}{2}$ to 6.....	56	45 $\frac{1}{2}$	$4\frac{1}{2}$ to 6.....	28	14
7 to 8.....	52	39 $\frac{1}{2}$	7 to 8.....	21	7
9 and 10.....	45	32 $\frac{1}{2}$	9 to 12.....	16	2
11 and 12.....	44	31 $\frac{1}{2}$			

To the large jobbing trade the above discounts on steel pipe are increased (on black) by one point, with supplementary discount of 5 per cent and (on galvanized) by 1 $\frac{1}{2}$ point, with supplementary discount of 5 per cent. On iron pipe, both black and galvanized, the preferentials to large jobbers are 1, 5 and 2 $\frac{1}{2}$ per cent beyond the above discount.

NOTE—The above discounts on steel pipe also apply to Lorain, Ohio. Chicago district mills have a base 2 points less. Chicago delivered base 2 $\frac{1}{2}$ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point having the lowest rate to destination.

Boiler Tubes

(F.o.b. Pittsburgh)

Lap Welded Steel

Inches	Steel Black	Galv.
2 to 2 $\frac{1}{2}$ in.....	27	37
$2\frac{1}{2}$ to 3 in.....	37	40
3 in. to 3 $\frac{1}{2}$ in.....	40	42 $\frac{1}{2}$
3 $\frac{1}{2}$ to 4 in.....	42 $\frac{1}{2}$	46
4 to 13 in.....	46	

Charcoal Iron

Inches	Charcoal Iron
1 $\frac{1}{2}$ in.....	+18
1 $\frac{3}{4}$ to 1 $\frac{1}{2}$ in.....	+8
2 to 2 $\frac{1}{4}$ in.....	2
$2\frac{1}{2}$ to 3 in.....	7
3 $\frac{1}{4}$ to 4 $\frac{1}{2}$ in.....	9

Beyond the above discounts, 5 fives extra are given on lap welded steel tubes and 2 tens on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
1 in.....	60		3 in.....	45	
1 $\frac{1}{4}$ and 1 $\frac{1}{2}$ in.....	52		3 $\frac{1}{4}$ to 3 $\frac{1}{2}$ in.....	47	
1 $\frac{3}{4}$ in.....	36		4 in.....	50	
2 to 2 $\frac{1}{4}$ in.....	31		4 $\frac{1}{2}$, 5 and 6 in.....	45	
$2\frac{1}{2}$ and 2 $\frac{3}{4}$ in.....	39				

Hot Rolled

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
2 and 2 $\frac{1}{4}$ in.....	34		3 $\frac{1}{4}$ to 3 $\frac{1}{2}$ in.....	50	
3 $\frac{1}{2}$ and 2 $\frac{3}{4}$ in.....	42		4 in.....	53	
3 in.....	48		4 $\frac{1}{2}$, 5 and 6 in.....	48	

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing (Old List)

Carbon under 0.30 base.....86 to 88 per cent off list
Carbon 0.30 to 0.40 base.....84 to 86 per cent off list
Plus usual differentials and extra for cutting. Warehouse discounts range higher.

Seamless Mechanical Tubing (New List)

Carbon 0.10 to 0.30 base.....55 per cent off list
Carbon 0.30 to 0.40 base.....50 per cent off list
Plus differentials for lengths over 18 ft. and for commercially exact lengths.

Prices of Iron and Steel Products and Raw Materials

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 51.50 per cent iron.....	\$4.55
Old range non-Bessemer, 51½ per cent iron.....	4.40
Mesaba Bessemer, 51.50 per cent iron.....	4.40
Mesaba non-Bessemer, 51.50 per cent iron.....	4.25
High phosphorus iron, 51.50 per cent.....	4.15

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian	9.50c. to 10c.
Iron ore, Swedish, average 66 per cent iron	9.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus.....	45c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, high grade, per unit, in 60 per cent concentrates.....	\$12.00 to \$13.00
Chrome ore, Indian basic, 48 per cent Cr. ₂ O ₃ crude, per ton, c.i.f., Atlantic seaboard.....	20.50 to 24.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York.....	65c. to 70c.

Coke and Coal

(Per Net Ton)

Furnace coke, f.o.b. Connellsville prompt.....	\$3.40 to \$3.75
Foundry coke, f.o.b. Connellsville prompt.....	\$4.00 to 4.50
Mine run steam coal, f.o.b. W. Pa. mines.....	1.50 to 2.00
Mine run coking coal, f.o.b. W. Pa. mines.....	1.50 to 1.75
Mine run gas coal, f.o.b. W. Pa. mines.....	2.00 to 2.25
Steam slack, f.o.b. W. Pa. mines.....	1.35 to 1.40
Gas slack, f.o.b. W. Pa. mines.....	1.40 to 1.60

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton.....	\$115.00
Ferromanganese, foreign, 80 per cent, f.o.b. Atlantic port, duty paid.....	115.00
Ferrosilicon, 50 per cent, delivered.....	82.50 to 85.00
Ferrosilicon, 75 per cent.....	145.00 to 147.50
Ferrotungsten, per lb. contained metal.....	1.10 to 1.20
Ferrochromium, 4 per cent carbon and up, 60 to 70 per cent Cr., per lb. contained Cr. delivered.....	11.50c.
Ferrovanadium, per lb. contained vanadium.....	\$3.50 to \$4.00
Ferrocobaltitanium, 15 to 18 per cent, per net ton.....	200.00

Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated)

Spiegeleisen, domestic, 19 to 21 per cent.....	\$32.00
Spiegeleisen, domestic, 16 to 19 per cent.....	31.00
Ferrosilicon, Bessemer, 10 per cent, \$33; 11 per cent, \$35; 12 per cent, \$37; electric furnace ferrosilicon, 10 per cent, \$33 furnace; 11 per cent, \$38; 12 per cent, \$39; 14 to 16 per cent, \$45.	
Silvery iron, 6 per cent, \$24; 7 per cent, \$25; 8 per cent, \$26; 9 per cent, \$27; 10 per cent, \$29; 11 per cent, \$31; 12 per cent, \$33.	

Fluxes and Refractories

Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, gravel, per net ton, f.o.b. Illinois and Kentucky mines.....	\$16.00
No. 2 lump, per net ton.....	19.00
Fluorspar, foreign, 85 per cent calcium fluoride, not over 5 per cent silica, c.i.f. Philadelphia, duty paid, per net ton.....	15.00 to 16.00
Fluorspar, No. 1 ground bulk, 95 to 98 per cent calcium fluoride, not over 2½ per cent silica, per net ton, f.o.b. Illinois and Kentucky mines.....	32.50
Per 1000 f.o.b. works:	
Fire Clay.....	
Pennsylvania.....	\$43.00 to \$46.00
Maryland.....	48.00 to 50.00
Ohio.....	43.00 to 46.00
Kentucky.....	43.00 to 45.00
Illinois.....	43.00 to 45.00
Missouri.....	40.00 to 43.00
Ground fire clay, per ton.....	6.50 to 7.50

Silica Brick:	
Pennsylvania.....	40.00
Chicago.....	49.00
Birmingham.....	54.00
Silica clay, per ton.....	8.00 to 9.00
Magnesite Brick:	
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.).....	65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.).....	40.00
Chrome Brick:	
Standard size, per net ton.....	48.00

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham and Chicago)	
Machine bolts, small rolled threads, .60 and 10 per cent off list	
Machine bolts, all sizes, cut threads, 50, 10 and 10 per cent off list	
Carriage bolts, smaller and shorter, rolled threads, 50, 10 and 10 per cent off list	
Carriage bolts, cut threads, all sizes, 50 and 10 per cent off list	
Eagle carriage bolts.....	.65 and 10 per cent off list
Lag bolts.....	.60, 10 and 10 per cent off list
Flow bolts, Nos. 1, 2 and 3 heads.....	.50 and 10 per cent off list
Other style heads.....	.20 per cent extra

Machine bolts, c.p.c. and t. nuts, ½ x 4 in.,

45, 10 and 5 per cent off list	
Larger and longer sizes.....	45, 10 and 5 per cent off list
Hot-pressed nuts, blank and tapped, square.....	4c. off list
Hot-pressed nuts, blank or tapped, hexagons.....	4.40c. off list
C.p.c. and t. square or hex. nuts, blank or tapped.....	4.10c. off list
Bolt ends with hot pressed nuts.....	.50, 10 and 10 per cent off list
Bolt ends with cold pressed nuts.....	.45, 10 and 5 per cent off list
Washers.....	6.50c. to 6.25c. off list

*F.o.b. Chicago and Pittsburgh.

The discount on machine, carriage and lag bolts is 5 per cent less than above for less than car lots. On hot pressed and cold punched nuts the discount is 25c. less per 100 lb. than quoted above for less than car lots.

(Quoted with freight allowed within zone limits)

Semi-finished hex. nuts:	
¾ in. and smaller, U. S. S.....	.80 and 5 per cent off list
¾ in. and larger, U. S. S.....	.75 and 5 per cent off list
Small sizes, S. A. E.....	.80, 10 and 5 per cent off list
S. A. E., ¾ in. and larger.....	.75, 10 and 5 per cent off list
Stove bolts in packages.....	.80, 10 and 5 per cent off list
Stove bolts in bulk.....	.80, 10, 5 and 2½ per cent off list
Tire bolts.....	.50, 10 and 5 per cent off list

Semi-Finished Castellated and Slotted Nuts

(Prices delivered within specified territories)

(To jobbers and consumers in large quantities)

	Per 100 Net		Per 100 Net
	S. A. E. U. S. S.		S. A. E. U. S. S.
¼-in.	\$0.44 \$0.44	¾-in.	\$2.35 \$2.40
½-in. ....	.515 .515	¾-in.	3.60 3.60
¾-in. ....	.62 .66	1-in.	5.65 5.80
1-in. ....	.79 .90	1¼-in.	8.90 8.90
1½-in.	1.01 1.05	1½-in.	12.60 13.10
2-in.	1.38 1.42	2-in.	18.35 18.35
2½-in.	1.70 1.73	2½-in.	21.00 21.00

Larger sizes—Prices on application.

Cap and Set Screws

(Freight allowed within zone limits)

Milled cap screws.....	.80, 10 and 5 per cent off list
Milled standard set screws, case hardened, 80 and 10 per cent off list	
Milled headless set screws, cut thread, 80 and 10 to 80 per cent off list	
Upset hex. head cap screws, U. S. S. Thread, 80, 10, 10 and 5 per cent off list	
Upset hex. cap. screws, S. A. E. Thread, 80, 10 and 5 per cent off list	
Upset set screws.....	.80, 10 and 10 per cent off list
Milled studs.....	.75 per cent off list

Semi-Finished Steel, f.o.b. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over.....	\$35.00
Forging billets, ordinary.....	40.00
Forging billets, guaranteed.....	45.00
Sheet bars.....	35.00
Slabs.....	35.00
*Wire rods, common soft, base, No. 5 to ¾-in.....	45.00
Wire rods, common soft, coarser than ¾-in., \$2.50 over base	
Wire rods, screw stock.....	\$5.00 per ton over base
Wire rods, carbon 0.20 to 0.40.....	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55.....	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75.....	7.50 per ton over base
Wire rods, carbon over 0.75.....	10.00 per ton over base
Wire rods, acid.....	15.00 per ton over base
Skelp, grooved, per lb.....	1.90c.
Skelp, sheared, per lb.....	1.90c.
Skelp, universal, per lb.....	1.90c.

*Chicago mill base is \$46. Cleveland mill base, \$45.

Alloy Steel

(F.o.b. Pittsburgh or mill)

S. A. E.	Series	Bars
Numbers		100 lb.
2100*	(½% Nickel, 10 to 20 per cent Carbon).....	\$3.00 to \$3.25
2300	(3% Nickel).....	4.50 to 4.75
2500	(5% Nickel).....	5.75 to 6.00
3100	(Nickel Chromium).....	3.50 to 3.65
3200	(Nickel Chromium).....	5.00 to 5.25
3300	(Nickel Chromium).....	7.50 to 7.75
3400	(Nickel Chromium).....	6.25 to 6.50
5100	(Chromium Steel).....	3.25 to 3.50
5200*	(Chromium Steel).....	7.50 to 8.00
6100	(Chromium Vanadium bars).....	4.25 to 4.50
6100	(Chromium Vanadium spring steel).....	4.00 to 4.25
9250	(Silicon Manganese spring steel).....	3.25 to 3.50
Carbon Vanadium (0.45 to 0.55 Carbon, 0.15 Vanadium).....		4.00 to 4.25
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium).....		4.50
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum).....		4.25
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum).....		3.75
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum).....		4.75 to 5.00

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for coal drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10-in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4-in. down to and including 2½-in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specifications, but numbered by manufacturers to conform to S. A. E. system.

FABRICATED STEEL

Awards of the Week Total About 27,000 Tons, While Inquiries Are Only 15,000

Including 12,000 tons for the Philadelphia subway, the week's structural steel awards, as reported to THE IRON AGE, were slightly less than 27,000 tons. Pending projects total close to 15,000 tons, of which 5700 tons is for subway work in New York. Awards include the following:

Broad Street subway, Philadelphia, 12,000 tons, to McClintic-Marshall Co.

Loft building, West Thirty-fifth Street, New York, 1000 tons, to A. E. Norton, Inc.

Apartment building, Eighty-fifth Street and West End Avenue, New York, 1000 tons, to Easton Structural Steel Co.

Loft building, Eighth Avenue and Thirty-seventh Street, New York, 1500 tons, to Levering & Garrigues Co.

Bronx Hospital, New York, 2100 tons, to Taylor-Fichter Steel Construction Co.

Apartment building, Fifth Avenue and Eighty-fifth Street, 1800 tons, to Post & McCord.

Apartment building, Fifth Avenue and Tenth Street, New York, 900 tons, to George A. Just Co.

Marcus L. Ward Home, Maplewood, N. J., 300 tons, to American Bridge Co.

Pennsylvania Railroad, bridge, 275 tons, to Fort Pitt Bridge Co.

Phillips Academy, Andover, Mass., 125 tons, to Hedden Iron Construction Co.

Bridge, Old Colony Parkway, Boston, 175 tons, to New England Structural Co.

Hotel, Troy, N. Y., 100 tons, to American Bridge Co.

State auditorium, Providence, R. I., 320 tons, to New England Structural Co.

St. George's Parochial School, Pittsburgh, 125 tons, to Jones & Laughlin Steel Corporation.

Toledo Machine Tool Co., Toledo, plant extension, 225 tons, to American Bridge Co.

Big Four Railroad, turntable, 100 tons, to Bethlehem Steel Co.

Tanks for municipal sewage treatment plant, Kansas City, Mo., 800 tons, to Kaw Boiler Works.

Wabash Railway, bridge, Montpelier, Ohio, 146 tons, to Bethlehem Steel Co.

Crawford County span, Wisconsin, 138 tons, to Illinois Steel Bridge Co.

A. O. Smith Corporation, Milwaukee, 1000 tons, reported as let to Milwaukee Bridge Co., was awarded to Lakeside Bridge & Steel Co.

Mississippi Glass Co., St. Louis, factory, 600 tons, to St. Louis Structural Steel Co.

Columbia-Cowlitz Railroad Co., State of Washington, 600 tons, to United States Steel Products Co.

Bridge, Aberdeen, Wash., 295 tons, to Wallace Equipment Co.

Upland Citrus Association, Upland, Cal., packing plant, 150 tons, to Pacific Iron & Steel Co.

Mutual Trust Co., office building at Walnut and Sydenham Streets, Philadelphia, 1300 tons, to Belmont Iron Works.

Pennsylvania Railroad, bridge, 150 tons, to McClintic-Marshall Co.

Hudson Motor Co., press shop, Detroit, 700 tons, to Massillon Bridge Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Highway bridge, Philadelphia, 200 tons.

Boston & Albany Railroad, station at Springfield, Mass., 300 tons.

Baptist Church, Miami, Fla., 1000 tons.

Junior high school, Albany, N. Y., 1500 tons.

Eighth Avenue subway, section No. 6, New York, 5700 tons; bids close Sept. 8.

Statler Hotel, Boston, 8000 tons, previously mentioned as an inquiry; general contract has been awarded to Dwight P. Robinson & Co., New York.

Winthrop Hotel, Boston, 1000 tons.

Candy factory, Cambridge, Mass., 260 tons.

Big Four Railroad, Cincinnati, bridges, 200 tons.

Ohio State Highway Commission, Columbus, bridges, 400 tons.

Chicago, Burlington & Quincy, office building and post office substation, Omaha, Neb., 800 tons.

Oil storage tanks, Houston, Tex., 1300 tons.

U. S. Engineers' Office, 428 Custom House, St. Louis, 6 steel barges, bids to be opened Sept. 21.

Leamington Hotel, Nineteenth and Franklin Streets, Oakland, Cal., 385 tons.

State Exposition building, Reno, Nev., 250 tons.

Atwater Kent Mfg. Co., Philadelphia, plant addition, 600 tons.

Straus & Schram, building, 3801 Lincoln Avenue, Chicago, 120 tons.

Michigan Central, plate girder bridges, 670 tons.

Grasselli Chemical Co., Cleveland, 200 tons, for factory buildings in Toledo, Ohio.

RAILROAD EQUIPMENT

Chesapeake & Ohio Inquires for 50 Locomotives —Car Business Is Very Light

Aside from the inquiry of the Chesapeake & Ohio for 50 locomotives, with the intimation that 60 additional may be bought, there is no new railroad business of importance in the market. No action has been taken on the car inquiries of the Illinois Central and New York Central, which comprise the only prospective car buying of large size. The principal items of the week follow:

The American Car & Foundry Co. has received orders for a total of 280 mine cars from the following companies: Cosgrove-Meehan Coal Co., 50; M. H. Howard Coal Co., 30; Ferguson Coal Co., 50; Peabody Coal Co., 50; Northumberland Mining Co., 100.

The Mid-Continent Petroleum Corporation has ordered 8 tank cars from the American Car & Foundry Co.

The Lehigh & New England Railroad has contracted with the American Car & Foundry Co. for the repair of 600 all-steel hopper cars.

The Erie Railroad will probably buy 25 steel underframes this week and has inquired for an additional 27.

The United Railways of Havana have inquired for 145 flat cars and 250 box cars for use on the Havana Central.

The Sierra Railway of California is in the market for 60 hopper cars.

The U. S. Iron Works has asked for prices on 10 flat cars. The Chesapeake & Ohio has issued inquiries for 50 heavy Mikado type locomotives and is expected to enter the market for 60 additional engines. Also included in this road's program are 125 caboose cars and 10 passenger and baggage cars.

The Chicago, South Shore & South Bend is inquiring for 10 combination smoking, passenger and baggage cars and 15 combination smoking and passenger cars.

Standard Sanitary Mfg. Co. Buys Pacific Coast Plant

SAN FRANCISCO, Sept. 1.—The Standard Sanitary Mfg. Co., Pittsburgh, has acquired control of the Pacific Plumbing Fixtures Co., Richmond, Cal., and will merge it with the Standard Mfg. Co. of California. It is announced that \$5,000,000 will be spent in Richmond during the next few years in extensions and other developments. The Pacific Plumbing Fixtures Co. employs 1000 men and operates three plants of an estimated value of \$3,000,000. Newton W. Stern, president and general manager of the company, will head the Standard of California, and W. C. Chamberlain, sales manager of the Eastern company, will remain on the Coast for some time adjusting the sales forces, which will be merged.

New Alloy Steel Bar Mills at South Chicago

Publication has been made at Chicago in the past week concerning the decision of the Illinois Steel Co. to build additional mills at South Chicago for the rolling of alloy steel bars. The appropriation for this improvement was made by the Steel Corporation some time ago, and it is estimated that the total expenditure will be about \$3,000,000. The mills will be electrically driven.

NON-FERROUS METALS

The Week's Prices

Cents per Pound for Early Delivery							
Copper, New York		Straits Tin (Spot)	Lead		Zinc		
Lake	Electro- lytic*	New York	New York	St. Louis	New York	St. Louis	
Aug. 26.....	14.87½	14.50	57.45	9.85	9.50	7.97½	7.62½
27.....	14.87½	14.50	57.25	9.85	9.50	7.95	7.60
28.....	14.87½	14.50	57.00	9.85	9.50	7.92½	7.57½
29.....	14.87½	14.37½	56.62½	9.85	9.50	7.92½	7.57½
31.....	14.75	14.37½	56.62½	9.85	9.50	7.92½	7.57½
Sept. 1.....	14.75	14.37½	56.62½	9.85	9.50	7.92½	7.57½

*Refinery quotation; delivered price ¼c. higher.

New York

NEW YORK, Sept. 1.

Decided quietness characterizes all the markets. Copper has declined and demand is light. Buying of tin has tapered off and prices are lower. The lead market is a little easier. Prices of zinc have declined.

Copper.—Pronounced speculative liquidation in foreign markets, particularly Germany and England, has unsettled the electrolytic market here, and prices have slowly sagged. Naturally consumers, who are always closely watching the situation, have turned indifferent and buying has largely vanished. The market, therefore, is decidedly quiet. Electrolytic copper has been available from a few sources for two or three days at 14.62½c., delivered, but this price is claimed to be rapidly disappearing. This compares with 14.90c. to 14.95c. as the peak of the movement about a week ago. Most large producers are adhering firmly to nothing less than 14.75c., delivered, or are out of the market. It is stated that considerable copper must still be bought, and that as soon as conditions change higher prices will rule with a spurt in buying. Statistically the market is sound and strong. Lake copper is quoted at 14.75c. to 14.87½c., delivered.

Copper Averages.—The average price of Lake copper for the month of August, based on daily quotations in THE IRON AGE, was 14.83½c. The average price of electrolytic copper was 14.48c., refinery, or 14.73c., delivered.

Tin.—Because consumers are pretty well covered, they show no interest in the market, which is exceedingly dull. For the week ended with Friday, Aug. 28, about 700 tons was sold, with the trading entire between dealers who were endeavoring to adjust speculative accounts. Were it not for this business, the market would have been flat and stagnant. Yesterday almost no business was done, but today close to 350 tons changed hands among dealers, with spot Straits quoted at 56.62½c., New York. Prices in London today were considerably lower than a week ago, with spot standard quoted at £250 5s., future standard at £253 2s. 6d. and spot Straits at £256 5s. The Singapore quotation yesterday was £259. Arrivals up to the last day of August were 7750 tons, with 6520 tons reported afloat. Deliveries of tin for the month of August were 6520 tons, which was about equal to expectations. The quantity in stock and landing on Aug. 31 was 3644 tons.

Lead.—The general situation is still a confused one, but the tightness has lessened. There is still a good demand for the metal, but the runaway character of the market is not as prominent. Buyers are not as ready as they were to pay premium prices. Anything above 10c. is reported to have disappeared with a general recession in the top prices. The leading interest advanced its contract price on Aug. 26 from 9.40c. to 9.50c., New York, while the principal seller in the West placed its quotation at 9.50c., St. Louis. Prices in the outside market, while covering a wide range, average about 9.85c., New York, and 9.50c., St. Louis.

Zinc.—Prime Western zinc is available at lower prices than a week ago, due largely to lower prices on

the other side. While there is still some demand, it has not been as active as recently, because consumers are watching for the bottom of the market. There has been very little change in ore prices in the West. Export demand is light.

Nickel.—Wholesale lots of ingot nickel are reported unchanged at 34c., with shot nickel at 35c. per lb. Electrolytic nickel is quoted at 38c.

Antimony.—Chinese metal for spot delivery and September arrival is quoted at 17c., New York, duty paid, with October arrivals held at 16.50c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 27c. to 28c. per lb., delivered.

Old Metals.—The market is very quiet. Dealers' selling prices are as follows in cents per lb.:

Copper, heavy and crucible	14.25
Copper, heavy and wire	13.25
Copper, light and bottoms	11.75
Heavy machine composition	10.25
Brass, heavy	8.75
Brass, light	7.75
No. 1 red brass or composition turnings	9.75
No. 1 yellow rod brass turnings	9.50
Lead, heavy	8.75
Lead, tea	7.25
Zinc	5.25
Cast aluminum	19.50
Sheet aluminum	19.50

Chicago

Sept. 1.—Tin, lead, zinc and antimony have declined, while copper remains unchanged. Stimulation of output among independents has had an adverse effect on lead. Antimony declined following the arrival of another foreign shipment. Zinc has eased off, although demand is still fair. Tin has receded in sympathy with the London market. Among the old metals copper grades and red brass have declined. We quote, in carload lots: Lake copper, 14.80c.; tin, 58c.; lead, 9.95c.; zinc, 7.65c.; in less than carload lots, antimony, 19c. On old metals we quote copper wire, crucible shapes and copper clips, 11.50 c.; copper bottoms, 10c.; red brass, 9c.; yellow brass, 7.75c.; lead pipe, 8 c.; zinc, 4.50c.; pewter, No. 1, 32.50c.; tin foil, 41c.; block tin, 46c.; all buying prices for less than carload lots.

Mechanical Engineers to Participate in National Steel Exposition

A technical session under the auspices of the machine shop practice division of the American Society of Mechanical Engineers will be held in Cleveland, Thursday morning, Sept. 17, in connection with the National Steel Exposition of the American Society for Steel Treating. The meeting will be at the Hollenden Hotel.

Two papers, with discussions, are planned. One is "Recent Developments in Surface Grinding," by Henry K. Spencer, general manager of the Blanchard Machine Tool Co., Cambridge, Mass. The other paper, by S. A. Keller, vice-president of the Keller Mechanical Engineering Corporation, Brooklyn, N. Y., is on the subject of "Modern Die Making."

The Kirk & Blum Mfg. Co., Cincinnati, has purchased the Robertson patents and machinery for manufacturing one-piece elbows, which are made out of a single piece of sheet metal rolled into a cylindrical form and then crimped by means of a special machine. The crimping process is found to give special strength to the elbow, and the elbow, being without riveting, is calculated to interpose minimum resistance to the flow of air or gases so that it is regarded as particularly well adapted in all work in which abrasion losses are otherwise heavy, such as metallic dust collecting systems.

Among the larger American firms which will have displays at the International Trade Exhibition, which will open at New Orleans, Sept. 15, are the United States Steel Products Co., New York; the Lukens Steel Co., Coatesville, Pa.; and Diebold Safe & Lock Co., Canton, Ohio.

What Is Iron?—What Is Steel?

(Concluded from page 604)

factory, but because it seemed to be the only way out of the difficulty.

As secretary of the international committee on the unification of the nomenclature of iron and steel appointed by the International Society for Testing Materials, of which Dr. Henry M. Howe was president, I took an active part in the deliberations. Along with some other metallurgists, I accepted the following definitions proposed by the committee as the best solution that could be offered:

Steel.—Iron which, in a liquid state, is cast into a practically malleable mass, at least initially, within some range of temperature.

Wrought Iron.—Malleable iron which is formed by the aggregation of pasty particles which do not undergo fusion, and which has such a low carbon content that it does not harden appreciably when it is cooled quickly.

As long as nothing but steel was produced in the converter and in the open-hearth furnace, this classification, though far from perfect, could hardly give rise to confusion. But from the day that a practically pure, carbon-free metal, of a purity hitherto unattained commercially, was made in an open-hearth furnace, the shortcomings of these definitions were brought out in a striking manner. To persist in designating as steel a practically pure iron, merely because it is made in the open-hearth furnace, is an offense to our common sense and intelligence.

These considerations have led me to submit the following definitions for discussion:

Commercial Iron.—Commercial iron consists of the element iron in as high a degree of purity as it can be obtained commercially.

Ingot Iron.—Ingot iron is commercial iron which has been produced in a liquid state and cast.

Wrought Iron.—Wrought iron is a malleable ferrous metal which has been produced from a pasty condition.

Steel.—Steel is a malleable alloy of iron and carbon

which generally contains substantial quantities of manganese.

A metal such as Armco ingot iron could then be defined as ingot iron produced in an open-hearth furnace and containing not over 0.02 per cent of carbon and not over 0.035 per cent of manganese.

If I were asked to draw a sharp line between ingot iron and steel on the basis of my nomenclature, I need only recall that ingot iron, as above defined, is distinguished from even the mildest steels by their respective manganese contents, which must not exceed 0.05 per cent in ingot iron, while it seldom falls below 0.20 per cent in steel. Moreover, ingot iron must not contain over 0.03 per cent of carbon, whereas steel seldom contains less than 0.05 per cent. Between a metal containing not over 0.03 per cent of carbon and not over 0.05 per cent of manganese, and one which does not contain less than 0.05 per cent of carbon nor less than 0.15 or 0.20 per cent of manganese, the margin is quite wide enough to permit of a sharp distinction in the chemical composition of ingot iron on the one hand and the mildest steels on the other.

Moreover, owing to its very low manganese content, ingot iron is red-short within a certain range of temperature, unless it contains much less than 0.02 per cent of sulphur; while low carbon steel, because it contains much more manganese, is not red-short, even though it may contain much more sulphur than the ingot iron.

Still another method of distinguishing between the two metals lies in the absence of the critical point A₁ in iron which contains less than 0.03 per cent of carbon and in the non-existence of pearlite in its micro-structure.

A sound and rational nomenclature of ferrous products is of importance alike to producers, consumers, and scientists who are interested in the metallurgy of iron and steel. The problem needs to be studied faithfully and honestly. All commercial considerations and technical sophistry should be set aside, and no recourse should be had to ingenious methods of side-stepping the difficulty.

Sustained Activity in the Valleys

YOUNGSTOWN, Sept. 1.—For the first week in September, iron and steel company property operations in the Mahoning and Shenango Valleys sustain the recent 70 per cent production rate. The Youngstown Sheet & Tube Co. is operating its district plants at 72 per cent. Tube mills at its Zanesville works are inactive.

The Republic Iron & Steel Co. has enlarged active open-hearth steel capacity, and has 12 to 15 furnaces melting. Except for three idle sheet mills, the Trumbull Steel Co. is running close to 100 per cent. The Sharon Steel Hoop Co. has one idle open-hearth furnace, one inactive sheet and one idle strip mill at its Youngstown and Sharon properties, but is otherwise engaged at normal.

The Mahoning Valley Steel Co. at Niles is operating all eight of its sheet mills, having added three in the past two weeks. In the Mahoning Valley, 106 sheet units were scheduled at the beginning of the week.

The Carnegie Steel Co. is maintaining active ingot capacity at its Ohio Works at 78 per cent, and is operating merchant steel bar capacity at 85 per cent. The Republic company has five bar mills under power, including its 14-16 in. unit and one plate mill.

In the Shenango Valley, the American Steel & Wire Co. has placed its plant on a full-week operating basis, against a five-day week heretofore. Rebuilding of stoves on No. 1 blast furnace at Sharpsville, Pa., of the Shenango Furnace Co. has been completed.

At McDonald, Ohio, the Carnegie company is bringing to completion the first of three new bar mills which are being installed, and it is expected the mill will get its initial tryout within two weeks.

Of 52 independent open-hearth furnaces scattered from Lowellville to Warren in the Mahoning Valley, 36 are in operation this week.

Some night shifts are being maintained at the Youngstown plant of the Truscon Steel Co., which reports a comfortable volume of unfilled orders, sufficient to engage its capacity close to normal for at least another month.

Disposal of Abandoned Mill Sites

PITTSBURGH, Aug. 31.—Wall Street financial writers have insisted that the Steel Corporation is to be a gainer by the sale of the sites of abandoned Pittsburgh properties. But the sites of some of the plants that have been, and are to be, scrapped are on leased land. Hence the financial gain is rather in the saving of taxes and in the production of steel at lower costs, elsewhere, than was possible in the abandoned units.

The Steel Corporation did own the site of the old Shoenberger plant and it owns the site of the Painter mills, but land occupied by the Upper and Lower Union and the Clark mills was leased. The site of the Painter mills will not be sold, as it is understood that present plans call for its use for a new warehouse for the Carnegie Steel Co. The present warehouse is on land owned by one of the Steel Corporation subsidiaries, and it is likely to be sold to the Pennsylvania Railroad in furtherance of the Pittsburgh terminal expansion program of that railroad.

The Hyman-Michaels Co., Chicago, has purchased the entire physical assets of the Kalamazoo, Lake Shore & Chicago Railway, which was granted permission by the Interstate Commerce Commission to discontinue service. The Hyman-Michaels Co. will shortly begin to dismantle the equipment and take up the rails. All this material, which includes a large quantity of 80 lb. relaying rails, will be offered for sale.

PERSONAL

Axel Sahlin, who withdrew from active engineering work in the iron and steel field in 1920 and now, on advice of doctors, is spending most of his time in the south of France, will be 70 years of age on Sept. 8. The consulting engineering and contracting business of which he was the head is continued by his partners, S. L. Bengtson and S. R. Olson, under the same name, the International Construction Co., Ltd., 56 Kingsway, London, England. Mr. Sahlin was born in Sweden and was graduated from the Technical University at Stockholm in 1877. He then went to England and afterward to the United States, where he was with the Cambria Iron Co., Johnstown, Pa., from 1881-86; and consecutively mechanical engineer to the Pottstown Iron Co., Pottstown, Pa., 1886-91; consulting engineer, New York, 1891-93; chief engineer and superintendent Maryland Steel Co., Sparrow's Point, Md., 1893-97; consulting engineer Brown Hoisting Machinery Co., Cleveland, 1897-98; general superintendent Millom & Askam Hematite Iron Co., Millom, England, 1899-1903; partner in the engineering firm of Julian Kennedy, Sahlin & Co., Ltd., from 1902-14, which firm was in 1915 transformed into the International Construction Co., Ltd., with offices in London, Sheffield and Paris. Mr. Sahlin has been representative in Europe for the Morgan Construction Co., Worcester, Mass., for many years. He has been connected with blast furnace, steel works and rolling mill construction in numerous works in the United States, Great Britain, France, Italy, Belgium, Germany, Austria-Hungary, Sweden, Russia and Spain, and for a time was constructing engineer to the Tata Iron & Steel Co., Ltd., in India. He has taken out numerous patents covering appliances for the manufacturing processes of iron and steel. He is knight of the Swedish Order of Wasa (R. W. O.), 1901; and knight of the Swedish Order of the North Star (R. N. O.), 1909. He is a member of engineering societies in the United States, Great Britain, Germany and Sweden.



AXEL SAHLIN

F. A. Scammell has been appointed assistant general manager of the Cambria works of the Bethlehem Steel Corporation, Johnstown, Pa., effective Aug. 16. He succeeds R. J. Wysor, resigned, who went to the Jones & Laughlin Steel Corporation as assistant general manager. Since 1920 Mr. Scammell has been superintendent of the Cambria works.

Lawford H. Fry, metallurgical engineer Standard Steel Work Co., Burnham, Pa., is scheduled to deliver an address on the "Influence of the Altoona Test Plant on Steam Locomotive Development" at a meeting of the American Society of Mechanical Engineers to take place at Altoona, Pa., Oct. 5, 6 and 7.

General William W. Atterbury, vice-president of the Pennsylvania Railroad System, will have conferred on him honorary membership in the American Society of Mechanical Engineers at the Altoona, Pa., regional meeting of the society, Oct. 5, 6 and 7.

W. C. Davis, president Foote Brothers Gear & Machine Co., recently was appointed member of the committee on commercial gear standards of the American Gear Association.

Arthur C. Jewett, engineer and authority on industrial education, has been named director of the college of industries at Carnegie Institute of Technology, Pittsburgh, for the coming college year. He was graduated from Massachusetts Institute of Technology in 1901. During the next two years he was employed as engineering draftsman with the American Bridge Co., then becoming an instructor at the University of Maine. Two years later he was head of the department of mechanical engineering, remaining in that capacity for ten years. Returning to industry, he joined Bird & Son, East Walpole, Mass., as engineering manager and two years later he became associated with the Winchester Repeating Arms Co., serving from 1916 to 1924 as production superintendent of the cartridge department. He was superintendent of engineering and personnel, and also manager of inventories and budget control, after the company's absorption of the Simmons Hardware Co. In June, 1924, Mr. Jewett joined the research staff of the National Industrial Conference Board on the study of relation of engineering education and industry.

Edward J. Dittmar, formerly superintendent of the Painter mills, Carnegie Steel Co., has been made general manager of the Ames Plant, Ames Shovel & Tool Co., North Easton, Mass.

Walter Harnischfeger, vice-president Harnischfeger Corporation, Milwaukee, manufacturer of electric cranes and machine tools, left Milwaukee on Aug. 27 for New York, to sail Sept. 3 for South America on a combined business and recreation tour. He is accompanied by Mrs. Harnischfeger. They will be away about two months.

J. O. Sievers, for the past 16 years in charge of industrial sales work in San Francisco for the General Electric Co., has resigned to become vice-president and general manager of the Coney & Kuchel Electric Works, contracting industrial engineers, 468 Fifth Street, San Francisco. Mr. Sievers is an electrical engineer and a graduate of the University of California. A. E. Coney was formerly manager of the transforming meter department of the Great Western Power Co. and C. Kuchel was associated with him in the same department.

W. McNamee, formerly purchasing agent Holt Mfg. Co., Peoria, Ill., has joined the sales organization of the Foote Brothers Gear & Machine Co., Chicago, as district representative for Indiana and all of Illinois except what lies west and south of Springfield.

V. C. Cartus, for the past seven years Eastern mill representative for Joseph T. Ryerson & Son, Inc., has resigned to become associated with A. B. Murray & Co., New York, in the steel warehouse business, with headquarters in New York.

J. V. N. Dorr, president Dorr Co., New York, arrived on the Olympic Aug. 26, after spending nearly three months in Europe in connection with European business of the company.

F. C. Houghten, since January, 1924, secretary of the American Society of Heating and Ventilating Engineers, at New York, has been appointed director of the research laboratory maintained by the society at Pittsburgh. He was formerly on the staff of the laboratory, following a connection begun in 1918 with the U. S. Bureau of Mines as physicist. He was born in Troy, Mich., in 1888, and was graduated from Olivet College, Olivet, Mich., in 1913.

Charles F. Rand, who has been in Europe for the past two months, will return to New York on Sept. 16.

Boyd G. Jack, who has been general manager of the Milwaukee Rolling Mill Co., Milwaukee, Wis., has been elected vice-president and general manager of the Empire Steel Co., Cleveland, formerly the Empire Rolling Mill Co.

OBITUARY

JOSEPH HUMPTON, who for 62 years has been prominently identified with the Lukens Steel Co., died Saturday night, Aug. 29, of toxic poisoning. He was ill for three weeks and prior to that time had been attending every day to his duties as secretary and treasurer of the Lukens Steel Co.



JOSEPH HUMPTON

He was born in Coatesville, March 3, 1846, and had been as closely interested in the public welfare activities of his home city as he was in the affairs of the Lukens Steel Co. He received his education in the public schools of Coatesville, supplemented by an academic course at Chester Valley, Pa. His first occupation was as a clerk in a general store, but he soon entered the employ of Huston & Penrose, the predecessors of the Lukens Steel Co., and he had been engaged in the steel business from that day until his death. He learned the steel business from the ground up, beginning in the office, then going into the mill as superintendent of the plate mill, then returning to the office. Mr. Humpton leaves a son, Charles F., who is assistant secretary and assistant treasurer of the Lukens Steel Co., and who will probably succeed to his father's position. The funeral was held Wednesday afternoon and burial was at Coatesville.

ROBERT J. LYND, president Lynd-Farquhar Co., Boston, died at his home in Newton Highlands, Mass., Aug. 31, following a protracted illness. He was born in Somerville, Mass., 50 years ago. For many years he was prominently identified with the New England machine tool industry. Early in life he was associated with the Chandler & Farquhar Co., latterly becoming a vice-president. In 1917, when the Lynd-Farquhar Co. was organized, he became its president.

JOHN KIMBALL SAVILLE, general manager Chicago Forging & Mfg. Co., Chicago, died at Highland Park, Ill., Aug. 25. He was born at Brookline, Mass., in 1887, and was educated at Newton, Mass., High School and Dartmouth College. He went to Chicago in 1908, entered the employ of the Mark Mfg. Co. and remained with that organization as plant manager at Evanston, Ill., until the successor company, the Steel & Tube Co. of America, was acquired by the Youngstown Sheet & Tube Co.

PAUL HAESSLER, purchasing agent Wisconsin Bridge & Iron Co., Milwaukee, died at the Mayo hospital in Rochester, Minn., on Aug. 19, following a series of operations. He was 36 years of age and was associated with the bridge works 20 years.

JOHN F. JOHNSON, pioneer manufacturer and executive of Racine, Wis., died Aug. 21 at the age of 81 years. He was born in Palmyra, Wis., in 1845 and in 1869 engaged in the manufacture of farm equipment at Racine, founding the present Johnson & Field Mfg. Co. Later he assisted in the establishment of numerous other large enterprises.

CLYDE BAUDER, proprietor of the Bauder Machine Works, Sterling, Ill., was killed by the fall of a scaffold in that city Aug. 21. He was 49 years old.

HARRY L. LIPPITT, president and general manager Atlantic Tubing Co., Providence, R. I., died on Aug. 24 at his summer home in Narragansett Pier. Mr. Lippitt was born near Athol, Mass., 59 years ago, and had been a resident of Providence for 30 years.

CHARLES W. WILDER, inventor of the Wilder lathe, died at his home in Fitchburg, Mass., on Aug. 25 in his seventy-ninth year. He was a native of Wilkonsville, Mass.

CHARLES F. PETTINGELL, for many years head of the Pettingell Machine Co., Amesbury, Mass., died on Aug. 25 at the Anna Jaques Hospital, Newburyport, Mass., aged 78 years.

JOHN BAILEY, mechanical superintendent New York, New Haven & Hartford Railroad, at West Haven, Conn., died Aug. 28 at the Mercy Hospital, Auburn, N. Y., following a three-days' illness.

ROBERT JOY, superintendent Kingsford Foundry Co., Oswego, N. Y., died suddenly at his home in that city, Aug. 25. He was born in Ireland 70 years ago and upon coming to this country located in Erie, Pa., where he was identified with the Erie City Iron Works and the Union Iron Works. He had been connected with the Oswego company for the past 35 years.

FRED E. MESTA, who only on May 1 succeeded his brother, the late George Mesta, as president of the Mesta Machine Co., West Homestead, Pa., died suddenly at his home there on Aug. 31. He was apparently in good health and was at his office as usual on that day. After dinner he went to the library of his home and a little later was found dead in a chair. Mr. Mesta was educated in the public schools of Bethel Township, Pa., his birthplace, and the high school of Leechburg, Pa. After obtaining his practical experience in the Leechburg Foundry & Machine Co. plant, he took up engineering and went into the company's engineering department. Later he had charge of outside erection work and was selling representative for the Leechburg concern. In 1898 he supervised construction of the present plant of the Mesta Machine Co. and became general superintendent when it began operations. He was elected a director and vice-president in charge of operations in April, 1912, and became president last May.



FRED E. MESTA

ALFRED D. CLINCH, chairman Underhill, Clinch & Co., New York, hardware jobbers, died Aug. 26 at New London, Conn., aged 71 years. He entered the hardware field 57 years ago. He was one of the founders and the treasurer since 1892 of the Hardware Club of New York, of which he was also a member of the board of governors.

EDWIN SMEETH, president Smeeth-Harwood Co., Chicago, brass founder, died at his home in Oak Park, Ill., Aug. 29, at the age of 63.

THEODORE M. NAGLE, aged 85, founder of the Nagle Boiler & Engine Co., and the Pennsylvania Boiler Works, Erie, Pa., died at his home in that city Aug. 27, following a long illness.

Small Improvement in Europe

Most Markets Stagnant — Swedish Production
Lower but Ore More Active—
Belgian Prices Weak

(By Cablegram)

LONDON, ENGLAND, Aug. 31.

CLEVELAND pig iron is quiet and prices are temporarily stable. There is a small amount of domestic business passing, but export sales are meager. Hematite is better, on good domestic demand. The proposed further restriction of output, accordingly, has been postponed.

Foreign ore is stagnant. Best Bilbao Rubio is quoted nominally at 20c. (\$4.86) c.i.f. Tees.

Continental semi-finished material is competing keenly on the local market. Foreign billets are being offered in the Midlands at £5 12s. 6d. (\$27.33) delivered, or nearly 20s. below the British quotation.

Finished steel prices nominally are steady, but makers undoubtedly would be willing to make concessions in favor of serious business. The Vulcan Foundry, Ltd., Newton-le-Willows, Lancashire, has secured orders for 20 express locomotives for the Buenos Aires & Great Southern Railroad and five engines for Tanganyika Territory.

Sheets and Tin Plate

Tin plate is still quiet and little business is passing either domestic or for export. Weak sellers are willing to accept 19s. (\$4.62) basis, but some works refuse to shade the 19s. 6d. (\$4.74) price. Bar makers are contemplating some modification in their quotation, but no substantial concession is yet imminent. The present output of the Welsh tin plate industry is at around 50 per cent of capacity.

Galvanized sheet market is firm on fair Indian demand. Makers of thick gages are comfortably booked, though thins are still quiet.

In black sheets the Japanese demand is the chief feature. The current value of Japanese 6 x 3 ft., 13's, 107 lb., is £15 7s. 6d. (3.33c. per lb.), though some

works are asking up to £15 15s. (3.41c.). Other specifications are quiet and steady.

On the Continent of Europe

Strikes at Belgian blast furnaces and steel works continue, though the engineering works dispute was settled, with the possible exception of the Ghent area.

In Germany business is quiet, a temporary difficulty being experienced in maintaining trust prices for steel, owing to heavy sales made before the syndicates were formed. Several furnaces in the Seigerland district have been blown out during August.

Polish-Silesian ironmasters are negotiating with the Czechoslovakian industry, with a view to a mutual price convention.

Inactivity in Steel-Consuming Industries Is Serious

LONDON, ENGLAND, Aug. 19.—The holidays in the West of Scotland, which of course create a general stoppage in the iron and steel industry in Glasgow and neighborhood, are now over, only, however, to be followed by the seasonal vacation in the northeastern district of England. Owing to these temporary disturbances of the normal it is less easy to gauge the actual state of trade and whether things are really getting duller or only seem to be so. The holiday naturally casts its shadow before and, in the few days immediately preceding it, business in Cleveland was very restricted.

Hematite has been a little better, partly on account of the relative cheapness of the price—about 75s. 6d. (\$18.34) for mixed numbers—but partly because there is a rumor that one of the producers proposes to close down and, as there are only nine furnaces operating on East Coast hematite, the stopping of further fur-

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.86 per £, as follows:

Durham coke, del'd..	£0 19s.	\$4.62
Bilbao Rubio ore†...	1 0½	4.98
Cleveland No. 1 fdy.	3 13	17.73
Cleveland No. 3 fdy.	3 9	16.76
Cleveland No. 4 fdy.	3 8	16.52
Cleveland No. 4 forge	3 7½	16.40
Cleveland basic	3 11½	17.37
East Coast mixed...	3 15½	18.34
East Coast hematite	4 19	24.06
Ferromanganese	15 10	75.33
*Ferromanganese	15 5	74.11
Rails, 60 lb. and up..	8 5	to £9 0s. 40.09 to \$43.74
Billets	6 10	to 7 5 31.59 to 35.23
Sheet and tin plate		
bars, Welsh	6 10	to 6 15 31.59 to 32.80
Tin plates, base box..	0 19	to 0 19½ 4.62 to 4.74
		C. per Lb.
Ship plates	8 0	to 8 10 1.73 to 1.84
Boiler plates	11 10	to 12 0 2.49 to 2.60
Tees	8 2½	to 8 12½ 1.76 to 1.87
Channels	7 7½	to 7 17½ 1.60 to 1.71
Beams	7 2½	to 7 12½ 1.54 to 1.65
Round bars, ¾ to 3 in.	8 12½	to 9 2½ 1.87 to 1.98
Galv. sheets, 24 gage	16 5	3.52
Black sheets, 24 gage	11 10	to 11 15 2.49 to 2.55
Black sheets, Japanese		
specifications	15 5	3.30
Steel hoops	10 15	and 12 10* 2.33 and 2.71*
Cold rolled steel strip,		
20 gage	18 0	3.90

*Export price.

†Ex-ship. Tees, nominal.

Continental Prices, All F. O. B. Channel Ports

Foundry pig iron:(a)					
Belgium	£3 1s.	to £3 2s.	\$14.82	to \$15.06	
France	3 1	to 3 2	14.82	to 15.06	
Luxemburg	3 1	to 3 2	14.82	to 15.06	
Basic pig iron:(a)					
Belgium	3 0	to 3 1	14.58	to 14.82	
France	3 0	to 3 1	14.58	to 14.82	
Luxemburg	3 0	to 3 1	14.58	to 14.82	
Billets:					
Belgium	4 12	to 4 13	22.35	to 22.60	
France	4 12	to 4 13	22.35	to 22.60	
Merchant bars:					
Belgium	5 7	to 5 8	1.16	to 1.17	
Luxemburg	5 7	to 5 8	1.16	to 1.17	
France	5 7	to 5 8	1.16	to 1.17	
Joists (beams):					
Belgium	5 3	to 5 4	1.11	to 1.12	
Luxemburg	5 3	to 5 4	1.11	to 1.12	
France	5 3	to 5 4	1.11	to 1.12	
Angles:					
Belgium	5 3	to 5 4	1.11	to 1.12	
½-in. plates:					
Belgium	6 16	to 6 17½	1.47	to 1.49	
Germany	6 16	to 6 17½	1.47	to 1.49	
¾-in. ship plates:					
Luxemburg	6 9		1.40		
Belgium	6 9		1.40		

(a) Nominal.

naces is a matter to make steel makers "sit up and take notice." The falling off in exports of foundry pig iron, however, is causing ironmasters in the Cleveland district "furiously to think." The Continental f. o. b. price is nearly 10s. (\$2.43) cheaper, and it can compete with Cleveland even in Scotland.

Plate Mills Not Well Employed

The strike in Belgium continues and, between the iron and steel trade and the engineering industry, involves about 80,000 men, but this does not appear to help much in increasing the activity of works here. The rail mills have some work on hand, but the general

position of the market for finished material is not happy, and boiler plates have been reduced by Scottish makers 20s.

Of course, with shipbuilding in its present state—45 per cent of the workmen are unemployed on the North-east Coast and 35 per cent in Scotland—the steel trade could hardly be good. Discussions are still proceeding between makers and men with a view to finding a remedy for the chronic depression in shipbuilding. It is to be hoped that some basis will be arrived at whereby costs can be diminished, and that eventually some improvement may be possible in this trade and its allied industries.

SWEDISH IRON AND STEEL

Production Below Pre-War—High Costs Partly Offset by High Prices

BERLIN, GERMANY, Aug. 18.—Since the spring the Swedish iron and steel industry has been campaigning for a 60 per cent increase in import duties, according to advices from Stockholm. The socialist cabinet, which in principle stands for free trade, has so far not consented; and the important engineering and electro-technical industries have, as consumers, opposed. The ground for the demand is competition from low-currency countries, aggravated by extremely high Swedish wages and production costs. Gold wages in Scandinavia rose during the war more than in any other European country; and the stabilization of the Swedish crown at its old gold parity has not improved things. The general price level has not fallen as a result of the stabilization, the wholesale index for June having been 161 against a low point of 157 in July, 1924.

Various technical attempts, chief of which is the Flodin electrical production of malleable iron directly from the ore, have been made to revive the trade. But the iron and steel industry, one of the oldest in Europe, must remain depressed until commercial factors undergo a change.

Decreased Production

The iron industry has never regained its pre-war production. In 1924 there was a considerable recovery, but in 1925 so far production has declined. Of 128 blast furnaces only 62 were in blast in early 1924, and only 42 in February, 1925. While pig iron imports have fallen as compared with before the war, exports have declined still more, so that the trade balance, though still active, is much less so than in 1913. Comparative figures are (in metric tons):

Pig Iron	Production	Imports	Exports	Net Exports
1913	730,300	120,700	208,000	87,300
1920	470,600	37,600	125,600	88,000
1921	314,400	11,300	88,300	77,000
1922	264,300	21,500	52,900	31,400
1923	282,600	35,000	119,900	84,900
1924	513,300	44,200	107,300	63,100
1925 (first half)	225,000	25,200	54,000	28,800

In semi-finished products there has been a still more marked change, because a large pre-war export surplus has been converted into an import surplus. Production has fallen off approximately in the same ratio as the production of pig iron:

Steel	Production	Imports	Exports	Export or Import Balance
1913	750,000	78,600	264,400	185,800 Exp.
1920	498,000	129,900	123,900	6,000 Imp.
1921	236,000	65,200	46,700	18,500 Imp.
1922	350,900	71,000	86,800	15,800 Exp.
1923	309,700	115,900	90,300	25,600 Imp.
1924	539,200	141,500	133,200	8,300 Imp.
1925 (first half)	272,000	67,400	61,000	6,400 Imp.

Increased delivery of foreign semi-finished materials at low prices has undoubtedly profited the finishing manufacturers; and in general the metal-consuming industries are prosperous. The disadvantage of high wages in these branches is counterbalanced by the fact that high-quality special wares are produced, some of which have to face little competition. In the first half of 1925 the value of Sweden's exports of electrical machinery exceeded that of the same period of 1913 by 254 per cent, that of separators by 49 per cent, that of ball bearings by 604 per cent. The higher prices

of to-day must here be taken into account. The export of motors increased only by 11 per cent, that of telephone apparatus, also a Swedish specialty, by 15 per cent.

Ore More Active

The iron ore mining industry is prosperous. Since July 1 the Swedish Grangesberg Co., which had been working only 5 days a week, has been operating at full capacity; and the less important mines are also fully occupied. In 1924 ore output reached 6,499,775 metric tons, which was 16 per cent more than in 1923, and about 6 per cent more than the average of the preceding ten years. The selling value of this output was 64,500,000 crowns, the average price per ton 9.91 crowns, or 0.81 crown higher than in 1923.

In 1913 ore exports totaled 6,400,000 tons. In 1918 they fell to 4,400,000 tons, and in 1919 to a low level of 2,400,000 tons, recovering in 1924 to 5,948,000 tons. Exports for 1925 will reach a still higher figure. In the first five months exports totaled 2,871,267 tons, or, including shipments from the Grangesberg Co.'s depots at Narvik in Norway, 3,189,000 tons. In June 925,000 tons were exported against 601,000 tons in June, 1924, and in July 793,000 tons, as against 583,000 tons in July, 1924. German buying largely accounts for this boom and, incidentally, also partly accounts for the Ruhr coal depression, because Swedish ore requires less fuel for smelting than French minette.

BELGIAN IRON AND STEEL

Little Business Passing—Prices Weak—Strike Continues

BRUSSELS, BELGIUM, Aug. 13.—The market is uncertain and lacks life; this is the period of holidays. Prices are unsettled, although not far from their former level. Pig iron and semi-finished products are quiet and little business has been done. As to steel, the situation is the same, if not worse. Competition prevails again with regard to sheets and prices have, in some instances, been decreased. Irons are weak also. The decision to continue the iron-workers' strike has caused a bad impression. Quotations are as follows:

Pig Iron.—No. 3 foundry iron, 320 fr. (\$14.63); ordinary basic iron, 310 fr. (\$14.17); Luxemburg foundry iron is quoted at 325 fr. (\$14.85).

Semi-Finished Products.—Basic blooms, £4 8s. 6d. (\$21.50); billets, £4 12s. (\$22.35); Lorraine and Sarre prices include larges (basic) £4 15s. (\$23.08).

Irons and Steels.—Bars, inland, 585 fr. (1.19c. per lb.); export, £5 7s. (1.16c.); large beams, £5 3s. (1.12c.); small beams, £5 4s. (1.13c.); wire rods, £5 12s. (\$27.20); Lorraine bars, £5 7s. (1.16c.); and Luxemburg bars, £5 7s. to £6 (1.16c. to 1.30c.).

Sheets.—Basic, 5 mm. (No. 6½ gage) and over, 685 fr. (1.40c. per lb.); export, £6 6s. (1.37c.); 3 mm. (No. 11½ gage), 735 fr. (1.50c.); 2 mm. (No. 14 gage), 825 fr. (1.68c.); 1 mm. (No. 20 gage) 1000 fr. (2.04c.); 0.5 mm. (No. 26 gage), 1150 fr. (2.35c.); Lorraine, for export, quotes £6 5s. to £6 10s. (1.35c. to 1.41c.).

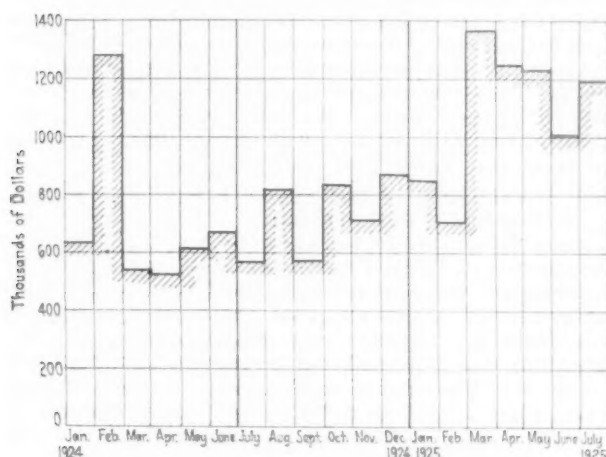
Blast furnace industry tends to spread in Holland. The Velsen works, which have only begun operations, possess two blast furnaces, of American type, each having the possibility of producing 250 tons of raw pig iron per day.

July Machinery Exports Higher

Lower Value Than March or April—Imports Lower in July
But Higher Than One Year Ago

WASHINGTON, Aug. 31.—Exports of machinery in July, 1925, were valued at \$32,320,533, as against \$28,746,061 in June. For the seven months ended with July of the present year they were valued at \$216,588,644, compared with \$185,902,269 for the corresponding period last year. Imports of machinery in July, 1925, were valued at \$905,872, compared with \$935,487 in June. For the seven months ended with July of the current year imports of machinery were valued at \$6,487,883, compared with \$5,708,061 for the corresponding period of 1924. Exports of metal-working machinery in July, 1925, totaled 5122 units, valued at \$1,188,069, as against 4168 units, valued at \$1,003,325, in June.

Outstanding figures in connection with machinery exports concern automobile engines, excavating machin-



For the Last Five Months Our Metal-Working Machinery Exports Have Exceeded \$1,000,000 Each Month. Only one month of the preceding 14 reached that figure

ery, oil well machinery, gear cutters, milling machines, metal-working machinery and sewing machines, all of which showed sharp increases over the value of these items in July one year ago. Especially was the increase great in the case of automobile engines. They show a rise to a value of \$1,067,330 in July, 1925, as against only \$175,037 in the same month one year ago, while for the seven months ended with July of the present year they were valued at \$10,728,600, as against only \$2,207,718 for the corresponding period of 1924. At the same time there were some marked declines, prominent among them being the drop in electric locomotives in July of this year, when the value was only \$35,618, as against \$428,951 in July, 1924.

Steam locomotives to the value of \$147,674 were exported in July, 1925, and for the seven months ended

with that month they were valued at \$3,487,390, an average of \$498,000 per month. Of the July exports of steam locomotives, the Philippine Islands was the leading consuming country, taking shipments valued at \$42,250, while for the seven months ended with July shipments of steam locomotives to the Philippine Islands were valued at \$70,000. Cuba ranked second in July, taking locomotives to the value of \$24,499, while for the seven months Cuban shipments were valued at \$301,109. Brazil came third, taking locomotives to the value of \$24,475 in July and for the seven months to the value of \$1,489,102.

Canada was the leading buyer of harvesters and binders in July, shipments to that country being valued at \$221,941 for the month, while for the seven months they were valued at \$324,133. Argentina ranked second, taking harvesters and binders to the value of \$155,663 in July and to the value of \$261,476 during the seven months.

Sewing machines to the value of \$134,311 were exported to the United Kingdom in July, while for the seven months the United Kingdom took \$1,069,511 worth of sewing machines. Mexico took sewing machines to the value of \$92,824 in July and \$695,648 during the seven months. Brazilian shipments of sewing machines for the two periods were valued at \$53,801 and \$413,481, respectively. Sewing machine exports to Colombia in July were valued at \$38,517 and for the seven months at \$233,461. Exports of sewing machines in July to Central America were valued at \$30,516 and for the seven months at \$153,799.

The United Kingdom was the leading country of exports of typewriters and printing presses in both July and the seven-month period. Exports of type-

United States Metal-Working Machinery Exports

	July, 1925		June, 1925	
	Number	Value	Number	Value
Lathes	118	\$245,423	129	\$177,483
Boring and drilling machines	138	69,268	170	36,183
Planers, shapers and slot-ters	22	28,905	33	87,795
Bending and power presses	46	78,882	40	52,723
Gear cutters	29	105,803	23	59,414
Milling machines	88	105,406	64	115,145
Thread-cutting and screw machines	57	63,511	68	103,075
Punching and shearing machines	24	31,374	13	11,543
Power hammers	31	34,531	24	63,303
Sharpening and grinding machines	117	282,026	115	197,536
Chucks, center, lathe, drill and other metal-working tools	2,834	30,685	2,256	27,847
Pneumatic portable tools	1,618	112,255	1,233	71,278
Total	5,122	\$1,188,069	4,168	\$1,003,325

United States Exports and Imports of Machinery

Imports of Machinery Into the United States				
(By Value)				
	July		Seven Months Ended July	
	1925	1924	1925	1924
Metal-working machine tools and parts	\$28,295	\$17,457	\$221,840	\$225,613
Agricultural machinery and implements	173,285	247,585	2,113,162	1,515,369
Electrical machinery and apparatus	43,869	29,909	476,297	230,169
Other power generating machinery	1,007	2,406	6,664	82,984
Other machinery	523,546	370,425	2,583,613	2,391,332
Vehicles except agricultural	135,870	151,987	1,086,307	1,262,594
Total	\$905,872	\$819,769	\$6,487,883	\$5,708,061

1924	Exports of Machinery	Imports of Machinery	Exports of Metal-Working Machinery
July	\$23,382,617	\$819,769	\$571,395
August	30,286,511	652,716	813,241
September	24,460,750	746,485	575,460
October	28,094,797	604,226	834,806
November	25,502,430	1,354,600	715,327
December	22,796,442	643,318	867,616
The year	317,034,987	9,711,571	8,644,444
1925			
January	28,117,952	803,829	845,986
February	23,215,776	814,703	707,445
March	35,962,076	999,237	1,364,930
April	36,033,980	1,167,099	1,245,634
May	32,164,865	861,655	1,230,914
June	28,746,061	935,487	1,003,325
Fiscal year	338,715,075	10,404,337	10,776,079
July	32,320,533	905,872	1,188,069
Seven months	216,588,644	6,487,883	7,586,302

Machinery Exports from the United States

(By Value)

	July 1925	July 1924	Seven Months July 1925	Seven Months July 1924
Locomotives.....	\$147,674	\$284,624	\$3,487,390	\$1,876,699
Other Steam Engines.....	185,198	168,411	1,039,934	1,820,288
Boilers.....	220,286	111,056	1,222,988	976,706
Accessories and Parts.....	208,494	323,060	1,093,774	2,186,702
Automobile Engines.....	1,067,330	175,037	10,728,600	2,207,718
Other Internal Combustion Engines.....	775,462	679,599	4,326,721	3,898,250
Accessories and Parts for.....	319,753	256,416	2,415,602	2,197,518
Electric Locomotives.....	35,618	428,961	294,381	1,481,360
Other Electric Machinery and Apparatus.....	514,617	522,292	3,852,394	4,761,668
Excavating Machinery.....	745,718	70,440	2,112,287	1,263,551
Concrete Mixers.....	68,085	58,384	429,387	376,232
Road Making Machinery.....	132,622	90,333	845,833	757,463
Elevators and Elevator Ma- chinery.....	225,750	126,214	1,299,228	1,096,043
Mining and Quarrying Ma- chinery.....	961,913	782,762	5,992,621	5,971,742
Oil Well Machinery.....	1,030,998	623,918	5,771,665	3,922,956
Pumps.....	617,307	511,072	4,096,454	4,203,497
Lathes.....	245,423	141,192	1,347,985	638,017
Boring and Drilling Machines, Planers, Shapers and Slotters.....	69,268	74,381	397,839	322,016
Bending and Power Presses.....	28,906	24,468	375,836	163,158
Gear Cutters.....	78,882	23,791	371,465	167,307
Milling Machines.....	105,803	27,299	519,727	234,640
Thread Cutting and Screw Machines.....	105,406	40,271	939,349	263,522
Punching and Shearing Ma- chines.....	63,511	43,075	607,333	364,388
Power Hammers.....	31,374	6,206	143,481	42,631
Sharpening and Grinding Ma- chines.....	34,531	20,175	171,892	118,997
Other Metal Working Ma- chinery and Parts of.....	282,026	137,181	1,867,446	980,347
Textile Machinery.....	573,270	290,997	3,254,719	2,431,797
Sewing Machines.....	973,695	768,766	6,220,036	5,190,244
Shoe Machinery.....	740,886	514,299	5,190,990	5,287,315
Flour-Mill and Gristmill Ma- chinery.....	93,728	98,533	848,845	772,014
Sugar-mill Machinery.....	59,438	55,867	627,403	494,203
Paper and Pulp Mill Machinery.....	734,070	683,697	3,091,188	2,341,018
Sawmill Machinery.....	143,623	238,163	824,410	1,380,092
Other Woodworking Machinery Refrigerating and Ice Making Machinery.....	48,892	35,998	455,014	312,090
Air Compressors.....	131,203	94,466	805,742	785,449
Typewriters.....	157,056	132,227	1,184,303	1,370,126
Lower Laundry Machinery.....	352,702	218,445	2,274,092	1,798,859
Typesetting Machines.....	1,382,150	1,635,089	10,684,881	8,842,343
Printing Presses.....	49,843	80,901	616,934	615,993
Agricultural Machinery and Implements.....	398,066	158,680	2,127,183	2,049,487
All Other Machinery and Parts.....	280,529	340,205	2,942,508	2,684,113
Total.....	7,270,293	4,376,512	43,413,467	37,515,816
	10,629,656	8,509,174	76,375,317	69,747,291
	\$32,320,533	\$23,382,617	\$216,588,644	\$185,902,269

writers to the United Kingdom during the two periods were valued at \$227,313 and \$1,955,693, respectively, while exports of printing presses to that country were valued at \$109,339 and \$733,737, respectively. Exports of typewriters to France in July and the seven-month period were valued at \$94,731 and \$1,207,667, respectively, while typewriter exports to Brazil in the two periods were valued at \$78,538 and \$467,057, respectively. This class of exports to British India during the two periods was valued at \$68,078 and \$292,893, while typewriter exports to Italy were valued at \$67,875 and \$731,180 for the respective period.

Accident Rate in Metal Industries

WASHINGTON, Aug. 31.—The August issue of the Monthly Labor Review of the Bureau of Labor Statistics, Department of Labor, carries figures on the accident experience of the metals and woodworking sections of the National Safety Council during 1924. The statistics show the accident severity rate per 1000 hr. experience was 2.08 in the metals section and 3.08 in the woodworking section, the higher rate in the woodworking section being accounted for by the inclusion of figures for sawmills and logging, which are extra hazardous industrial pursuits. Comparison of frequency and severity rates over a series of years shows the fluctuations always to be expected with shifting industrial conditions, with a slight but distinct downward trend.

A forming press having a 7-in. stroke, 16-in. die space, a bed plate 42 x 72 in. and a 300-ton ram pressure capable of handling ¼-in. sheet metal has been added to the equipment of the Breese Brothers Co., Cincinnati, manufacturer of sheet metal parts.

NON-FERROUS METALS

Welsh Industries in First Half of 1925 Show Large Shrinkage

BY C. C. FRICK*

DECREASED imports and exports in the Welsh copper and zinc industries are recorded for the first half of 1925, and a generally prosperous condition in the nickel industry was accompanied by a slight decrease in exports of cubes and rondels, the total being 2123 gross tons, compared with 2419 tons in the same period of 1924. Exports of nickel sulphate, however, increased from 671 tons in the January-June period of 1924 to 1034 in the first six months of 1925. The largest exports were assigned to France, Germany, Japan and Italy, but it appears probable that a good many of the shipments to France and to certain other countries were intended for transshipment to the United States.

Copper and Copper Sulphate

Imports of copper material amounted to 21,307 gross tons during the first half of 1924, and to 20,922 tons in that portion of 1925. These imports were largely matte from Canada, ore from Spain, precipitate, bars and slabs from Belgium. Copper exports (manufactured and otherwise) decreased from 1971 tons in the first six months of 1924 to 1102 tons in 1925. The former total included a shipment of 500 tons of copper matte. Statistics do not indicate the form of the other exports, but it is probable that most of them were sheets and rods; Belgium, Greece, India and France were conspicuous among the destinations.

Exports of copper sulphate came to 21,402 gross tons in the first half of 1924 and to only 11,631 tons in that period of 1925. France took first place among the countries of destination during the former period, with shipments of 11,988 tons, but the largest amount in the latter period—6937 tons—went to Italy. No explanation for the smaller shipments in 1925 has been advanced. The annual exportation of copper sulphate takes place almost entirely in the first five months of the year, and goes to vine-growing countries to be used in solution as a spray.

Zinc and Galvanized Sheets

A comparison of zinc figures for the same periods—first half of 1924 and of 1925—shows a decrease in slab imports from 1205 tons to 915 tons, and in imports of concentrates from 34,372 tons to 29,740 tons. The former come from Belgium and the latter from Australia. The slab zinc output of the Welsh industry is all consumed on the domestic market, chiefly in the galvanized sheet works in the vicinity of Swansea. Depression in this business has caused the zinc industry to operate at only 70 per cent of its capacity for the past 12 months. There are six local plants engaged in smelting zinc ores.

*United States Vice-Consul at Swansea, Wales.

Increase in British Steel Imports but Decline in Exports

Sustained increase in imports and a lowered level in exports has been the record of the British steel industry in the last year. The official data were as follows in gross tons for the half year periods since Jan. 1, 1923:

Six Months Ended	Imports	Exports
June 30, 1923.....	762,225	2,282,040
Dec. 31, 1923.....	772,257	2,155,309
June 30, 1924.....	1,451,936	2,077,839
Dec. 31, 1924.....	1,436,488	1,863,581
June 30, 1925.....	1,449,188	1,892,746

In the last two and one-half years imports of iron and steel have increased nearly 100 per cent, or from 762,225 tons to 1,449,188 tons. In the same period exports have declined 16 per cent or from 2,282,040 tons to 1,892,746 tons. At the end of the first half of 1923, the excess of exports over imports was 1,519,815 tons; at the end of the same six months this year, this excess had fallen to only 443,558 tons.

Exhibitors and What They Will Display at the National Steel Exposition

(Continued from page 605)

operation two spindle No. 2 sensitive drills, one with automatic feed and one with tapping unit; one single spindle No. 2 Aveymatic with motor on spindle; one single spindle No. 1½ high speed hand feed of new design of motor mounting; one two spindle No. 3, one spindle with Aveymatic feed, one with tapping head. Represented by: J. G. Hey, J. Mirrielees, Mr. Hazeldine and L. B. Patterson, president.

B

BADGER TOOL Co., Beloit, Wis. Booth 258. No. 220 Badger motor driven grinder, built in type, automatic machine complete in operation; No. 8 Badger belt driven grinder with power operated lever feed tables. Represented by: E. B. Gardner, president; John Nielsen, vice-president; H. I. Kelley, secretary; R. D. Gardner, treasurer.

BAKER BROTHERS, Toledo, Ohio. Booth 246. No. 525 model heavy duty drilling and boring machine; No. 24 semi-automatic cam feed drilling machine; No. 3 horizontal duplex cam feed drilling and boring machine. Represented by: George E. Hallenbeck, vice-president; H. D. Tigges, sales engineer; W. W. Elliott, sales engineer; William Baker, treasurer.

JOHN BATH & CO., INC., Worcester, Mass. Booth 47. Ground thread tools, including ground taps, hobs, roll thread dies, plug thread gages and chasers. Bath internal micrometers. Represented by: John Bath, president and treasurer; J. Chester Bath, vice-president.

BAUSCH & LOMB OPTICAL Co., Rochester, N. Y. Booth 24. Metallographic equipment, with some new features; Contour measuring projector and several new optical devices for shop use. Represented by: W. L. Patterson, I. L. Nixon, H. L. Shipley, F. C. Lau, L. V. Foster.

BELLEVUE INDUSTRIAL FURNACE Co., Detroit. Booth 121. Bellevue high speed furnace with section cut away showing inner construction; Bellevue high temperature fire brick; Bellevue oil and gas burners. Represented by: Walter E. Hinz, president and general manager; L. J. Raymo, sales manager.

BELLIS HEAT TREATING Co., Branford, Conn. Booth 117. Lavite heating medium; annealed steel, nichrome, nickel silver, copper, brass; hardened carbon, alloy and high speed steel, tools and dies; intricate dies with record performances after Lavite heat treating. Represented by: A. E. Bellis, president; W. E. Hitchcock, treasurer; J. W. Black, superintendent; G. C. Davis, New England representative; C. E. Wistar, Cleveland representative.

BETHLEHEM STEEL Co., Bethlehem, Pa. Booths 20, 21, 31 and 32. Educational exhibit, concentrating on Lehigh Mill products, such as alloy and tool steels and miscellaneous merchant mill products and special sections, interesting castings made from mixtures of Mayri iron, drop forgings and small difficult press forgings. Represented by: H. G. Walton, D. A. Barkley, R. MacDonald, C. E. Chamberlain, F. W. Baldwin, T. J. Fitzgibbons, R. S. Tucker, W. C. Cutler, J. C. Chandler, P. Kreulin, A. D. Smith, all of sales department; A. P. Spooner, engineer of tests; Robert Shimer, sales metallurgist; Walter Trumbauer, H. Wyss, director of research; A. D. Shankland, metallurgical inspector; G. A. Richardson, technical publicity director, and others.

BILTON MACHINE TOOL Co., Bridgeport, Conn. Booth 217. No. 3½ and No. 6½ Pro-Ducto-Matic milling machines in operation. Represented by E. A. Harper, vice-president.

BLACK & DECKER MFG. Co., Towson, Md. Booth 46. Portable electric drills, portable electric grinders, bench drill stands, post drill stands, electric bench grinders, electric twist drill grinders, electric tappers, electric screw drivers and electric socket wrenches, all in operation. Represented by: W. C. Allen, sales supervisor, R. D. Black, advertising manager; C. M. Hall, Cleveland branch office; G. M. Buchanan, industrial department; W. J. Fenwick, J. T. McQuillin and T. C. Cornell, salesmen.

BLANCHARD MACHINE Co., Cambridge, Mass. Booth 256. Blanchard automatic surface grinder and washing attachment in operation. Represented by H. F. Skillings and C. L. Jones.

BRISTOL Co., Waterbury, Conn. Booth 33. Pyrometers and temperature controllers for heat treating furnaces. Represented by: H. L. Griggs, general sales manager;

C. W. Bristol, chief engineer; R. M. Walker, Pittsburgh-Cleveland district manager; H. W. Moss, Detroit district manager; L. G. Bean, Boston district manager; C. C. Eagle, Philadelphia district manager; H. G. Hall, Chicago district manager; H. E. Bean, Birmingham district manager.

BROWN INSTRUMENT Co., Philadelphia. Booths 65, 66. A new line of Brown recording pyrometers which include single recording, duplex, 6-record multiple, triple duplex (3 records on each of the two halves of a duplex chart) and control; indicating control pyrometer which controls automatically the temperature at two points in a furnace; portable potentiometer; Duplex CO₂ and temperature recording meter for checking combustion efficiency in large furnaces; new types of motor operated control valves, including valves for controlling oil and air, gas and air, or for controlling furnace dampers; thermocouples and other temperature control equipment. Represented by: R. P. Brown, president; G. W. Keller, sales manager; C. L. Simon, technical director of advertising; M. M. Watkins, assistant sales manager; R. W. Mayer, Detroit district manager; G. L. Clapper, Pittsburgh district manager; D. C. Mayne, Columbus district representative; W. E. Woodrow, Pittsburgh district representative.

BROWN & SHARPE MFG. Co., Providence, R. I. Booths 234, 235. No. 6 high-speed automatic screw machine. Hobbing machine. No. 33 automatic milling machine. Small tools. Cutters. Represented by: J. G. Swinburne, W. Spencer and J. H. Skelton, factory representatives.

BROWN LYNCH SCOTT Co., Monmouth, Ill. Booth 120-A. Perfection cleaner and grader for carburizing compound. Represented by: J. A. Scott, secretary and general manager, and W. B. Lynch.

BULLARD MACHINE TOOL Co., Bridgeport, Conn. Booth 253. Vertical 42-in. turret lathe. Represented by James Welch.

BUREAU OF STANDARDS, Washington. Booth 113. Photographs and special equipment indicating the fields of co-operation with various industries, particularly relating to iron and steel; material on recently completed investigations; a large number of publications prepared by staff members; soil corrosion test samples, special rivet steels, a new optical extensometer, etc. Represented by: H. J. French, O. X. Klopsch, H. S. Rawdon, T. C. Digges, staff members.

C

ANDREW C. CAMPBELL, INC., Bridgeport, Conn. Booth 232. No. 1 Campbell nibbling machine, belt drive type; No. 1-B Campbell nibbling machine, motor driven in operation on ¼-in., ½-in. and ¾-in. steel; No. 2 Campbell nibbling machine, motor driven in operation on ¼-in., ½-in. and ¾-in. steel. Represented by Stuart Naramore, sales manager, and J. Johnson, engineer.

CARBORUNDUM Co., Perth Amboy, N. J. Booth 17. Small gas-fired furnace to show visually the difference in conductivity of various refractory tile; gas-fired furnace showing application of carborundum chambers for heat treating; carbofrax brick and tile; carbofrax and firefrax high temperature cements. Represented by: J. A. King, sales representative, New England; C. A. Dutton, sales representative, Detroit and Cleveland; R. S. Baker, sales representative, Chicago; S. A. Fenno, assistant sales manager.

CARPENTER STEEL Co., Reading, Pa. Booth 48. Display of tools made from Stentor oil hardening tool steel. Represented by: F. A. Bigelow, president; J. H. Parker, vice-president; C. A. Hell, district sales manager; J. N. Clarke, F. W. Cuttis and F. G. Davis, V. W. Gardner, sales representatives; F. R. Palmer and W. H. Kemper of the metallurgical department; H. J. Joyce, Jr., sales representative.

CASE HARDENING SERVICE Co., Cleveland. Booth 41. Carbonizing compounds, cyanide mixtures, drawing and tempering salts, heat resisting containers, lead pot covering and a complete line of hardening room supplies. Represented by: W. C. Bell, president; E. J. Gossett, vice-president; James S. Ayling, sales manager.

CELITE PRODUCTS Co., Los Angeles, Cal. Booth 102. Insulating brick, insulating powder, insulating cement, high temperature cement and water-proofing compound for brick surfaces. Represented by M. L. Jenkins, sales engineer.

CENTRAL STEEL Co., Massillon, Ohio. Booths 51, 52, 67, 68. Special steel products. Represented by: F. J. Griffiths, president and general manager; B. F. Fairless, vice-president in charge of operation; J. M. Schlendorf, vice-president in charge of sales; W. M. Garrigues, assistant general manager of sales; D. B. Carson, assist-

ant sales manager; G. F. Hess, sales department, Massillon office; F. L. Gibbons, district sales manager, Cleveland; Arthur Schaeffer, district sales manager, Detroit; T. B. Davies, district sales manager, Syracuse, N. Y.; E. C. Smith, chief metallurgical engineer; C. P. Richter, assistant chief metallurgical engineer; William Leffler, A. J. Wilson, M. M. Clark and R. K. Bowden, metallurgical engineers.

CINCINNATI BICKFORD TOOL CO., Cincinnati. Booth 257. One 20-in. high speed, sliding head upright drill having power feed, fitted with tapping attachment and arranged with self contained belted motor drive; one 21-in. direct drive movable head upright drill with power feed, fitted with tapping attachment, chip pan lubricating outfit and arranged with self contained variable speed motor drive; one 4-ft. 32 speed plain radial drill fitted with plain table, lubricating outfit, air column binder, arranged for variable speed motor drive on base with control unit on head. Represented by: Nell C. Schauer, sales manager; R. M. Husband, factory representative; S. K. Wallace, factory representative.

CINCINNATI MILLING MACHINE CO., Cincinnati. Booth 255. Cincinnati centerless grinder fitted with automatic grinding attachment and automatic feeding device for grinding valve tappers; new type Cincinnati face mill grinding machine which grinds with cup wheel; new style pyramid column inclosed motor drive No. 2 Universal milling machine; Cincinnati Duplex automatic equipped on a production job demonstrating intermittent feed; new Cincinnati saddle type grinding machine; No. 3 plain high power pyramid column inclosed motor drive milling machine. Represented by: J. E. Caster, W. F. Stegner, L. V. Johnson and Walter W. Tangeman.

CINCINNATI PLANNER CO., Cincinnati. Booths 252, 261. One 36 x 36 x 8 ft. Hypo planer in operation. Represented by: B. B. Quillen, president; George Langen, works manager; Tom Addison, chief engineer; Carl Linden, sales manager; George Lamoth, demonstrator.

CINCINNATI SHAPER CO., Cincinnati. Booth 217. Heavy Cincinnati climax shaper, 24-in., complete with all standard equipment, arranged for motor drive, including 10 hp. type SK General Electric motor, with starter, in operation. Represented by: H. S. Robinson, sales manager; George Diehl, factory demonstrator.

CLEVELAND AUTOMATIC MACHINE CO., Cleveland. Booth 233. In operation: Cleveland multiple spindle automatic machine. Represented by: H. W. Ruppel, assistant general manager; H. M. Rich, vice-president and treasurer; A. W. Schaffer, sales representative.

CLEVELAND TWIST DRILL CO., Cleveland. Booths 269, 270, 280. Three drill presses in operation, demonstrating Cle-Forge high speed drills, brass drills and peerless high speed reamers. Represented by: Harley G. Smith, Thomas Thomas, Francis A. Kelly, R. D. Boltey, F. M. Hoelzie, A. J. Ireland, H. S. White and C. G. Franz, sales representatives; W. E. Caldwell, manager of sales; H. P. Jensen, assistant manager of sales; J. B. Dillard, general superintendent; H. J. Baier, chief engineer, and D. H. Burdett, assistant to general superintendent.

COLONIAL STEEL CO., Pittsburgh. Booths 26, 37. Square split tool steel ingots; square split heat-treated alloy tool steel die blocks; hardened high speed, carbon and alloy tool steel fractures in glass case showing various specimens on different degrees of heating; iron, pure muck bar and all raw materials used in manufacture of high grade tool steel; pyramid of blocks from 1 to 12-in. square; forgings, including oil well bits; sections of different grades of high speed, carbon and alloy tool steel including plow shapes, section steel, hollow and solid drill steel, safe and jail steel and a number of polished specimens; electrical display in operation. Represented by: J. Trautman, Jr., general sales manager; N. B. Hoffman, chemist and metallurgist; F. L. Stevenson, Cleveland district sales manager; Herbert Bray, Chicago district sales manager; Charles Kopenhoefer, Cincinnati district sales manager; W. H. Rieger, special representative; Mr. Hamilton and Mr. Hill, Cleveland; Mr. Largey, Pittsburgh; Mr. McKinnon, Detroit.

COOPER HEWITT ELECTRIC CO., Hoboken, N. J. Booth 206. Work-light. Standard industrial units in operation. Represented by: C. F. Streibig, sales manager; S. H. Knapp, district manager, Cleveland; D. R. Grandy, commercial engineer; H. M. Ferree, engineering department.

CRUCIBLE STEEL CO. OF AMERICA, New York. Booths 74, 75 and 76. Steel and steel products. Represented by: E. C. Collins, president; Dr. John A. Mathews, vice-president; A. T. Galbraith, general manager of sales; R. Michener, general sales agent; F. E. Phelps, Cleve-

land district manager; R. C. Webster, Cincinnati district manager; J. W. Taylor and M. S. Dravo of Pittsburgh; B. F. Altman, Cleveland representative and A. H. Kingsbury.

D

N. C. DAVISON GAS BURNER & WELDING CO., Pittsburgh. Booth 216. A "Home" oil burner; combination oil and gas burner for industrial furnaces. Represented by: N. C. Davison, president, and Edward Poor, manager of shop.

DAVENPORT MACHINE TOOL CO., Rochester, N. Y. Booth 255. Five-spindle automatic screw machine. Represented by: Metch & Merryweather Machinery Co.

DEARBORN CHEMICAL CO., Chicago. Booth 63. No-ox-id rust preventive. Represented by: E. M. Converse, director department of specialties; C. I. Loudenback, Detroit manager; E. H. Ruhlman, Cleveland manager.

HENRY DISSTON & SONS, INC., Philadelphia. Booth 22. Inserted tooth circular metal cutting saw in operation; metal cutting band saw in operation; metal cutting products such as milling saws, metal sliding saw, hack saw blades, fibre, etc. Represented by: S. Horace Disston, vice-president; George Satterthwaite, vice-president; D. W. Jenkins, general manager domestic division; J. Clifford Forrest, manager metal cutting department; Charles T. Evans, manager steel sales; S. T. Harleman, assistant manager steel sales; H. B. Allen, chief metallurgist; C. H. Williams, manager of steel works; J. L. Dorrington, salesman; E. J. Ludy, demonstrator; J. R. Kauffman, salesman; Norman Bly, metallurgist; K. L. Clark.

DONNER STEEL CO., Buffalo. Booth 93. Forgings and finished parts. Made from the company's material. Represented by: W. F. Vosmer, vice-president; F. R. Huston, vice-president in charge of operation; J. A. Buell, general superintendent; C. A. Cherry, assistant to vice-president; E. D. Pumphrey, Detroit representative; H. C. Richardson, Cleveland representative; J. W. Donner, inspection engineer; R. E. Sherlock, metallurgical engineer.

DRIVER-HARRIS CO., Harrison, N. J. Booth 95. Nichrome carburizing pots heated by electric furnace wound with Nichrome ribbon; Nichrome castings for heat treating applications; Nichrome glass roll showing machinability and high finish attainable; motor cylinder block of cast iron with small percentage of Nichrome; Nichrome cast grids; working exhibit of spark plugs using D-H wire; brake band linings using D-H wire; Nichrome retorts; Clmet (iron-chrome) castings. Represented by: G. A. Lennox, assistant general manager; W. E. Blythe, Detroit district sales manager; Mr. Waldrup, Mr. Prior and Mr. Tietz.

E

ELECTRIC FURNACE CO., Salem, Ohio. Booth 116 B. T-Grid electric furnaces for heat treating, annealing, carburizing and enameling; electric heating equipment for special processes; sample construction of large furnaces, views of installation, data on operation, etc. Represented by: R. F. Benzinger, vice-president and sales manager; E. T. Cope, chief engineer; F. J. Peterson, Detroit representative.

ELECTRO ALLOYS CO., Elyria, Ohio. Booth 114A. Thermo-alloy high temperature heat resisting castings. Represented by: A. H. Miller, Jr., E. C. White, W. J. Hansen, R. C. Culver, W. C. Whyte, J. B. Thomas, A. L. Garford and J. W. Henry.

ELECTRICAL REFRACTORIES CO., East Palestine, Ohio. Booth 120B. Refractories for use in all resistance type electric heating devices, in industrial furnaces, hanger blocks or supports for the support of electric heating elements, in stationary industrial furnaces; also muffles and muffle plates, together with terminal supports for small industrial furnaces; refractories for use in domestic equipment. Represented by: F. E. Owen, president; C. W. Williams, secretary-treasurer; F. C. Simms, general manager.

CHARLES ENGELHARD, INC., New York. Booth 53. Engelhard rare metal pyrometers and base metal pyrometers; thermo-couple protecting tubes, including a complete line of auxiliary apparatus; new Engelhard type S and type SM recorders, electric resistance thermometers, electric gas analyzers, automatic temperature controllers for fuel fire furnaces, automatic temperature controllers for electric furnaces. Represented by: E. S. Newcomb, sales engineer; Henry De Gallaix, ceramic engineer; R. W. Newcomb, manager.

EX-CELL-O TOOL & MFG CO., Detroit. Booth 287. XLO standard drilled jig bushings; general tools; XLO high-

speed ball bearings and high-speed internal grinding spindles, featuring XLO air turbine driven spindle in use on $\frac{3}{8}$ -in. and $\frac{1}{2}$ -in. holes; sample bushings with holes ground; XLO belt-driven internal grinding spindles. Represented by: N. A. Woodworth, president and general manager; Clifford Peacock, vice-president; Philip A. Huber, secretary; C. R. Alden, sales manager; William F. Wise, special representative; E. H. Hopson, service representative.

F

FIRTH-STERLING STEEL CO., McKeesport, Pa. Booths 14 and 15. High speed, carbon and alloy tool steels, with samples of raw materials used and the various processes of manufacture. Represented by: C. O. Ericke, C. E. Hughes, Edwin T. Jackman, Alan Jackman, G. A. Jacobs, T. A. Larecy, W. A. Nungester, I. Olsen, W. C. Royce, M. E. Burkemer; D. E. Jackman, Jr., Al. Mattson, Henry I. Moore, W. A. Ruppel, A. C. Leete, D. G. Clark and Frank Marth.

J. B. FORD CO., Wyandotte, Mich. Booth 56. Wyandotte cleaning specialties. Represented by: F. R. Merrick, L. C. Warden, T. S. Blair, C. R. Beaubien, B. N. Goodell and Chief Little Bear.

G

WILLIAM GANSCHOW CO., Chicago. Booth 62. Ganschow speed reducers, samples of cut gearing and samples of heat treating. Represented by C. H. Thomas, sales engineer.

GARDNER TAP & DIE CO., Cleveland. Booth 18. High-speed taps. High-speed ground taps. Carbon taps of various types. Special taps of high-speed steel and carbon tool steel. Represented by: J. M. Gardner, president; C. M. Jackson, secretary; H. P. Boggis, sales manager; Fred Criley, engineer and metallurgist.

GATHMANN ENGINEERING CO., Baltimore, Md. Booth 107. Improved quality sound ingots; Gathmann patent ingot molds; Chafin "Slago" sink head casings; Gathmann built-up sinkhead casings; sound ingots of non-ferrous base; photographs of ingot molding; etched sections of ingots and billets; pamphlets descriptive of quality ingot production. Represented by: Emil Gathmann, vice-president and general manager; Mark Gathmann and George A. Dornin, sales engineers.

GENERAL ALLOYS CO., Boston. Booths 42 and 58. Q-alloy carburizing boxes, cyanide and lead pots, retorts, muffles, glass dies, conveyor chains, enamel burning racks, ore roasting furnace parts, oil-still parts, cyanide dipping baskets, sheet and cast pans and trays, hearth plates and furnace parts, and Q-alloy miscellaneous castings. Represented by: H. H. Harris, president; E. P. Van Stone, vice-president; W. K. Leach, A. L. Grinnell, J. J. Donovan, L. J. McCarty, R. M. Kirk, H. G. Chase and A. D. Heath.

GENERAL ELECTRIC CO., Schenectady, N. Y. Booth 99. Electric furnaces and automatic electric arc welding; in operation. Represented by: D. G. Brokaw, R. F. Newell, L. B. Rosseau, Walter Anderson, L. A. MacKenney, H. E. Scarborough, C. H. Lockwood, C. L. Ipsen, A. N. Otis and C. T. McLoughlin.

GEOMETRIC TOOL CO., New Haven, Conn. Booth 233. Self-opening and adjustable die heads, self-opening and adjustable rotary die heads, solid adjustable die heads, adjustable collapsing taps, solid adjustable taps. Geometric chaser grinder, Geometric threading machine (single and double spindle), Geometric bench threading machine, adjustable hollow milling tools, Jarvis high speed tapping devices, Jarvis Friction tapping devices, Jarvis quick change chucks and collets and Jarvis self-opening stud setters. Represented by: E. W. Mertz, F. W. Gowrie, E. J. Gilles, F. A. Barker, E. L. Wood, metallurgist; G. A. Denison, sales manager.

GISHOLT MACHINE CO., Madison, Wis. Booth 223A. New Gisholt 3L all steel geared head turret lathe with new features of design; Gisholt 4B universal turret lathe; Gisholt precision balancing machine for rotative parts, all operating. Represented by: E. S. Chapman and C. B. Carr.

GIDDINGS & LEWIS MACHINE TOOL CO., Fond du Lac, Wis. Booths 244 and 245. No. 45 high power precision horizontal boring, drilling and milling machine; No. 13 Teromatic internal grinding machine; No. 140 G & L portable universal radial drilling machine. Represented by: H. B. Kraut, vice-president and general manager; C. Gebuhr, in charge of sales; G. A. Fabst, sales representative; W. J. Porter, sales representative.

GODDARD & GODDARD CO., Detroit. Booth 90. High production milling cutters, both standard and special. Also railroad cutters. Represented by: A. N. Goddard, president;

C. H. Wallace, railroad demonstrator; R. T. Rice, Cleveland representative; E. E. Toerner, Cincinnati representative; E. E. Guntert, Rochester, N. Y., representative; C. S. Goddard, general sales manager.

Goss & De LEEUW MACHINE CO., New Britain, Conn. Booth 266B. Four-spindle automatic chucking machine. Represented by: Stanley T. Goss, president and treasurer; Joseph J. Spring, sales engineer; Edwin H. Peck, manager of demonstration and service.

GOULD & EBERHARDT, Newark, N. J. Booth 247. Invincible shaper, 32-in. cutting Heppenstall die blocks; 16-HS manufacturing hobber, type B cutting transmission gears; 32-in. shaper. Represented by: H. W. Jacobson, George H. Davis and Frederick G. Eberhardt, president and A. A. Miller.

G. A. GRAY CO., Cincinnati. Booth 237. Gray openside planer, maximum service type. Represented by: August Marx, president and general manager; Tell Berna, sales manager; F. E. Cardullo, chief engineer; Philip Leisinger, planer superintendent.

H

GEORGE J. HAGAN CO., Pittsburgh. Booth 13. Installation of a full automatic rotary furnace for handling small regular shaped pieces on a production basis. Materials to be heated will be charged into and discharged from the furnace automatically, the rotating hearth stops and starts automatically and the temperature is controlled automatically. All materials discharged from the furnace pass directly to the quenching medium without contact with the air. Also complete photographic display of many operating installations of practically every type of many heating furnace, together with operating data. Represented by: R. E. Talley, president; H. G. Hammer, treasurer; J. Sandberg, Detroit district manager; V. A. Hain, Chicago district manager; C. F. Cone, J. L. Edwards and A. D. Dauch.

HALCOMB STEEL CO., Syracuse, N. Y. Booths 56 and 85. Tools made from carbon, special and high-speed steels; automotive and special engineering parts made from Halcot alloy brand steels; parts made from non-corrosive steels. Represented by: H. J. Stagg, assistant manager; M. P. Spencer, assistant sales manager; J. H. Hinkley, district manager, Chicago; J. F. Kirwan, district manager, Cleveland; Arthur Schroeder, district manager, Detroit; T. F. Wood, district manager, Syracuse; F. W. Ross, district manager, New York; S. C. Spalding, metallurgist; J. T. Leyden, J. H. Schnibbe, E. F. Talmage.

HAMMOND MFG. CO., Cleveland. Booth 212. An eight-spindle automatic deep hole drilling machine, motor driven; a radial stud driver and nut setter, motor drive; one column and base radial drilling machine, with friction tapping attachment, motor driven; a cabinet base motor driven polishing and buffing machine; all in operation. Represented by: C. M. Allen, president; W. D. Buss, manager and superintendent.

HANSON-WHITNEY MACHINE CO., Hartford, Conn. Booth 282. Universal semi-automatic thread milling machine, universal vertical tool and die shaping machine, universal tap sharpening machine, ground taps, ground thread gages, ground precision screws, ground thread rolling dies and ground hobs. Represented by: William K. Stamets, sales representative; J. W. Johnson, engineer; E. A. Hanson, engineer.

HEALD MACHINE CO., Worcester, Mass. Booths 267 and 268. Style No. 72 full automatic internal grinding machine; No. 72 semi-automatic internal grinding machine; No. 25 down feed surface grinding machine. Represented by: R. M. Lippard, Cleveland district manager; R. A. St. John, assistant Cleveland district manager; James N. Heald, treasurer and general manager; S. T. Massey, sales manager; F. N. Grimshaw and R. A. St. John, sales engineers.

HEPPENSTALL FORGE & KNIFE CO., Pittsburgh. Booth 106. Red enameled die block with top surface nickel plated. Represented by: George I. Allen, Cleveland representative; E. O. Jenkins, Rochester representative; Frank C. Meyer, Detroit representative; George O. Desautels, Indianapolis representative; C. W. Heppenstall, president and treasurer.

HEVI DUTT ELECTRIC CO., Milwaukee. Booth 23. Electric heat treating furnaces. Represented by: E. L. Smalley, president; F. S. Weiser, chief engineer; F. A. Hansen, sales manager; H. W. Lincoln, district manager; Edward Busch, district manager.

HEIM GRINDER CO., Danbury, Conn. Booth 215. Heim centerless cylindrical grinding machine, in operation, equipped with full automatic attachment and motor driven, together with all necessary equipment for han-

dling through and shoulder grinding. Represented by: F. M. Angevin, general manager; C. Booth, works manager; R. Krametz and C. Previdi.

HOLCROFT & Co., Detroit. Booth 16. Photographs, drawings and data on heat treating furnaces, melting furnaces and continuous kilns. Represented by: C. T. Holcroft, president; H. L. Ritts, secretary-treasurer; Alfred Ruckstahl, engineer.

E. F. HOUGHTON & Co., Philadelphia. Booths 54, 55. Heat treating materials, Vim leather belting and Vim leather packings; electric pots for liquid heat and drawing temperatures. Represented by: H. G. Lloyd, H. E. Cressman, W. J. Wright, Robert Smith, J. C. Bentley, W. A. Buechner, F. L. MacNamara, W. A. Fletcher, I. D. Fletcher, D. D. Reed and E. C. Redlin.

HOSKINS MFG. Co., Detroit. Booth 98. Electric tool furnace equipped with automatic temperature control; pyrometers, chromel thermocouples and chromel resistor alloys. Represented by: C. S. Kinnison, advertising manager; W. D. Little, sales manager; W. A. Gatword, chief engineer; J. D. Sterling, manager of Cleveland district.

I

INTERNATIONAL MACHINE TOOL Co., Indianapolis. Booth 215. Type "C" 24-26-in. Libby lathe with 7½-in. hole through spindle, arranged for machining locomotive crank pins and other heavy turret lathe work. Represented by F. H. Robertson, special representative and representative of the Syracuse Supply Co.

INTERNATIONAL NICKEL Co., New York. Booths 78 and 89. Parts made of nickel-steel; castings, forgings, automotive and aeroplane parts; tools, saws, chisels, etc; die blocks, roller bearings, gears, steel mill rolls, turbine blades and castings of nickel cast iron. Represented by: A. J. Wadhams, manager development and research department; Dr. P. D. Merica, director of research; Charles McKnight, Jr., T. H. Wickenden and J. S. Vanick, development and research department; L. Muller Thym and R. A. Wheeler, sales department.

INTERSTATE IRON & STEEL Co., Chicago. Booth 108. Automatic parts made from Interstate steels; metallurgical data collected on various grades; samples of raw open-hearth steel. Represented by: Paul Llewellyn, vice-president, Chicago; W. J. Mackenzie, metallurgist, Chicago; E. Larned, assistant metallurgist, Chicago; John A. Guyer, Cleveland representative; R. S. Lebarre, Detroit representative; W. H. C. Carhart, assistant metallurgist, Chicago.

THE IRON AGE PUBLISHING Co., New York. Booth 83. Current issues of THE IRON AGE and reprints of special sections. Represented by: W. W. Macon, E. F. Cone, R. E. Miller, F. L. Prentiss, G. L. Lacher, F. J. Frank, R. E. Barr, E. Findley, D. G. Gardner, B. L. Herman, Peirce Lewis, Charles Lundberg, C. L. Rice, W. B. Robinson, F. W. Schultz, E. Sinnock, W. C. Sweetser, D. C. Warren, F. S. Wayne, C. S. Baur.

J

JESSOP STEEL Co., Washington, Pa. Booth 119. Finished products made from Jessop tool steels; raw materials used in the manufacture of Jessop's American tool steels. Represented by: V. M. Wellman, Cleveland manager; R. K. Greaves, Detroit manager; V. H. Lawrence, metallurgist; J. M. Curley, Boston representative; C. R. Trimmer, Chicago manager; E. V. Vogeley, New York manager; W. J. Fredericks, Cincinnati salesman.

JONES & LAMSON MACHINE Co., Springfield, Vt. Booths 229 and 230. Hartness flat turret lathes; 15-in. chucking machine and 2¼ x 24-in. bar machine in operation; Hartness automatic die head; Hartness screw thread comparator; Fay automatic lathe operating; Flanders ground thread taps. Henry S. Beal, assistant general manager; Charles N. Seaver, Cleveland; F. L. Watkins, Detroit; J. L. Reilly, Indianapolis.

JONES & LAUGHLIN STEEL CORPORATION, Pittsburgh. Booth 79. Various sizes of rolled shapes. Represented by: A. A. Wagner, assistant manager of sales, hot rolled department; E. A. France, district sales manager, Cleveland office; J. G. Hutchinson, Cleveland office; S. A. Fuller, Cleveland office, and others.

K

KARDEX-RAND Co., Tonawanda, N. Y. Booth in lobby. All types of visible record equipment, the merged lines of Kardex Co., Rand Co., and Index Visible Co. Represented by: W. C. Mowry, Cleveland district manager; A. H. Fritchman, S. S. Shane, P. A. Eaton, J. H. Mahrer, L. Glueck, I. M. Stubbart, A. T. Hoover.

KEARNEY & TRECKER CORPORATION, Milwaukee. Booth 205. No. 2B plain Milwaukee milling machine, new style external motor drive, equipped with special production service reciprocating fixture for milling clutch teeth in small bevel gears; No. 1B vertical Milwaukee milling machine, late style motor-in-base drive, equipped with special production service rotary fixture for milling slots in wrist pin set screws. Represented by: Clarence Hochmuth, demonstrator; Theodore Trecker, president; E. J. Kearney, secretary-treasurer; Joseph B. Armitage, chief engineer; Joseph Trecker, production department; W. K. Andrew, production service department; George L. Erwin, Jr., sales department; R. A. J. Wellington, manager Cleveland branch.

KELLER MECHANICAL ENGINEERING CORPORATION, Brooklyn, N. Y. Booths 248 and 249. Type BL Keller, all around die, tool and pattern room machine. R-6 Keller cutter and radius grinder; BK-3 Keller roller floor stand flexible shaft grinder; BK-1 Keller bench type flexible shaft grinder with high speed attachment. Represented by: S. A. Keller, secretary and treasurer; Jules Dierckx, vice-president and sales manager; Charles Bitter, A. J. Benson, P. D. Brown and M. Mayer.

KELLY REAMER Co., Cleveland. Booth 284. Block unit adjustable boring and reaming tools; multiple bladed adjustable boring and reaming tools; hardened and ground bars; strip piloted bars; mandrels and arbors; Kelly production tools. Represented by: E. W. Putnam, general manager; M. C. Daw, chief engineer; A. H. Howard, sales representative.

KEYSTONE LUBRICATING Co., Philadelphia. Booth 88. Demonstration of the Keystone safety lubricating system as applied to rigid and movable bearings. Represented by: Peter Cassady, western manager Chicago; M. C. Schwenk, Detroit representative; Victor Berguson, Cleveland representative; F. D. Street, sales engineering department, Philadelphia.

W. B. KNIGHT MACHINERY Co., St. Louis. Booth 214. No. 3 Knight miller. Represented by W. B. Knight, Jr.

KING MACHINE TOOL Co., Cincinnati. Booth 236. One 42 in. gear box motor driven boring mill in operation. Represented by E. A. Muller, vice-president.

KING REFRACTORIES Co., Niagara Falls, N. Y. Booth 19. High-temperature cements and Mono baffles in operation. One balopticon machine; advertising literature and samples of cements. Represented by: S. C. Smith, president; F. A. Podwils, Cleveland representative.

L

LANDIS TOOL Co., Waynesboro, Pa. Booths 293 and 294. Crank grinding machine; internal grinding machine; hydraulic traverse grinding machine, 6 x 20 in.; hydraulic traverse grinding machine, 10 x 36 in. Represented by W. G. Nevin, sales manager; J. S. Baker and I. S. Deardorff, Cleveland representatives; F. Griner and C. M. Talhelm, Detroit representatives.

LEEDS & NORTHRUP Co., Philadelphia. Booth 10. Hump method hardening furnace and new circulating air drawing furnace in operation; indicating and recording potentiometer pyrometers and automatic controllers in operation; potentiometer controllers in operation and other applications of steel treatment. Represented by: G. W. Tall, Jr., in charge of furnace sales; E. B. Esterbrook, district manager; A. E. Tarr, Chicago district manager furnace sales; W. A. Lane, furnace sales representative; T. C. Smith, furnace sales representative; J. Korp, furnace sales representative; J. P. Docherty, furnace sales representative; J. W. Harsch, research metallurgist; H. Brewer, in charge of pyrometer sales; P. H. Taylor, Chicago district manager pyrometer sales; O. Brewer, Cleveland district manager pyrometer sales; A. F. Moranty, pyrometer sales representative; H. R. Abey, pyrometer sales representative; C. C. Graf, pyrometer sales representative.

LEHMANN MACHINE Co., St. Louis. Booth 285. One 24-27-½-in. x 11-ft. bed Lehmann sixteen speed geared head engine lathe arranged for motor drive through belt and idler, with standard equipment and taper attachment fitted. Also several units, such as headstock with cover removed, hardened spindle and apron for 24-in. lathe. Represented by Paul Lehmann, president and chairman.

E. LEITZ, INC., New York. Booth 35. Leitz micro-metallograph of latest design, model 1925, with new features and improvements; metal specimens photographed at a magnification of 10,500 diameters; new grinding and polishing machines for metal specimens; a low power magnifier for use in steel and metal plants for visual examination of fractures and flaws; the Leitz ore dressing microscope. Represented by W. Zieler and J. Vollrath, technical advisors.

LELAND-GIFFORD Co., Worcester, Mass. Booth 204. No. 1, 12-in. 1-sp. floor type motor spindle ball bearing drilling machine; 1, 12-in. 2-sp. floor type belt drive ball bearing machine with motor mounted on rear of machine, with power feed on 1 spindle; No. 1 ball bearing taper on second spindle. No. 2, 14-in. 1-sp. motor spindle drilling machine; No. 2, 14-in. 3-sp. belt drive drilling machine with motor mounted on rear of column, complete with power feed and tapping attachment. No. 3, 24-in. 1-sp. belt drive ball bearing drilling machine, with motor mounted on rear of column, complete with power feed; No. 2 EM Washburn Shops drill grinder; all operating. Represented by: S. Nikoloff, vice-president; S. B. Dowd, sales manager; A. H. Anderson, Cleveland manager; E. A. Heidlinger, Detroit manager.

LIBERTY MACHINE TOOL Co., Hamilton, Ohio. Booths 218 and 219. In operation, one 36 x 36 in. x 10 ft. two housing late model Liberty planer, to be equipped for reversing motor drive with motor mounted on the floor and connected to driving shaft through a Grundy coupling. Planer to be equipped with two rail heads and two side heads employing individual motors to each side head for power rapid traversing vertically and to rail head for control of power rapid traverse, as well as elevating or lowering of rail. Represented by: A. R. McCann, vice-president and general manager; A. Lutzig, general superintendent, and J. Milliken, purchasing agent.

LODGE & SHIPLEY MACHINE TOOL Co., Cincinnati. Booth 260. Lodge & Shipley duomatic lathe. A 14 x 6 selective head tool room lathe, with all tool room equipment. Represented by: Fred Albrecht, sales manager; J. N. Stephens, special representative.

LUCAS MACHINE TOOL Co., Cleveland. Booth 242. Precision horizontal boring, drilling and milling machine and Lucas power forcing press. Represented by: F. P. Sprague, sales representative; J. A. Leighton, sales representative.

LUDLUM STEEL Co., Watervliet, N. Y. Booths 29 and 30. Tool steels, carbon and alloy; high speed steels; special alloy steels; rust- and stain-resisting steels and iron; heat resisting steels; non-corrosive steels; methods of producing these steels and representative tools made therefrom. Represented by: H. G. Batcheller, vice-president and general sales manager; W. H. Vrooman, assistant manager of sales; C. B. Templeton, sales department; A. K. Martin, superintendent; R. P. DeVries, metallurgist; W. H. Keen, metallurgist; W. J. Fitzgerald; W. L. Weaver, Albany district; T. C. Sherman, Cleveland district sales manager; P. R. Thurston, Cleveland district; W. Kinsey, Cleveland district; J. E. Polhemus, Detroit district sales manager; H. W. Spiegel, Detroit district; H. I. Askew, Jr., Detroit district; J. J. Cruice, Detroit district.

M

MARSCHKE MFG. Co., Indianapolis. Booth 292. A 20-in. heavy duty grinder and 12-in. general duty grinder in operation, each fully equipped with latest design wheel guards of two types. Represented by W. A. Marschke, vice-president and sales manager.

MIDVALE Co., Nicetown, Philadelphia. Booth 77. Diesel engine crankshaft, brass extrusion cam; forged and hardened rolls for cold rolling; tools manufactured from Midvale tool steels; hammer piston rod. Represented by: Stuart Hazlewood, H. H. Ziesing and H. E. Rowe of Philadelphia; Ward A. Miller, New York; Fred. W. Sager, Chicago; Harry Teel, Detroit, and T. G. Besom, New York.

MONARCH MACHINE TOOL Co., Sidney, Ohio. Booth 207. Monarch Junior motor driven lathe. Helical geared complete tool room lathe, 16 x 6 ft.; helical geared extra heavy duty manufacturing type lathe, 18 x 6 ft.; a 22 x 10 ft. helical geared extra heavy duty lathe. Represented by: W. E. Whipp, general manager, and J. A. Raterman, sales representative, in connection with Strong, Carlisle & Hammond Co., representative.

MORRIS MACHINE TOOL Co., Cincinnati. Booth 286. Three-ft. heavy duty radial drill arranged for motor drive. Represented by: E. G. Meckstroth, superintendent, and Arthur C. Pletz, general manager.

MORSE TWIST DRILL & MACHINE Co., New Bedford, Mass. Booth 82. Drills, reamers, cutters, taps, dies, chucks, arbors and Universal grinding machine. Represented by: William T. Read, vice-president and treasurer; F. O. Lincoln, vice-president in charge of sales; Waldo F. Congdon, Milton G. Bonner and Robert W. Mein.

MOTCH & MERRYWEATHER MACHINERY Co., Cleveland. Booths 244 to 261 inclusive. Including exhibits of the following: Abrasive Machine Tool Co., East Providence, R. I.; Acme Machine Tool Co., Cincinnati; Badger Tool Co., Beloit,

Wis.; Baker Brothers, Toledo; Blanchard Machine Co., Cambridge, Mass.; Bullard Machine Tool Co., Bridgeport, Conn.; Cincinnati Bickford Tool Co., Cincinnati; Cincinnati Milling Machine Co., Cincinnati; Cincinnati Planer Co., Cincinnati; Davenport Machine Tool Co., Rochester, N. Y.; Avey Drilling Machine Co., Cincinnati; Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.; Gould & Eberhardt, Newark, N. J.; Keller Mechanical Engineering Corporation, Brooklyn, N. Y.; National Equipment Co., Springfield, Mass.; Lodge & Shipley Machine Tool Co., Cincinnati; Production Machine Co., Greenfield, Mass.; Thompson Grinder Co., Springfield, Ohio, and V. & O. Press Co., Hudson, N. Y. Exhibits of these companies are detailed elsewhere under each company's name. Represented by: G. E. Merryweather, president; E. R. Motch, secretary, E. R. Motch, Jr., R. J. Houck, J. A. Phelps, W. F. Wissman, W. F. Hall, A. B. Einig, W. F. Gallen and R. G. Knapp, all of Cleveland; E. A. Shriver, manager, M. H. Dones and L. C. Lobitz of the Cincinnati office; E. C. Batchelar, manager; J. T. McCuen, L. A. Rafferty, J. A. Menges, L. C. Deckard and J. L. Vance of the Pittsburgh office; R. C. Handloser, manager; E. F. Lickey, E. A. Guntrum, H. C. Bayless, J. F. Dittus, V. Gottsman and N. H. Carpenter of the Detroit office.

N

NATIONAL AUTOMATIC TOOL Co., Richmond, Ind. Booths 228, 238. Natco-Garvin horizontal duplex driller No. 288; Natco automatic driller No. C-13-C; Natco automatic taper No. C-13-A; Natco-Minister Hi-duty driller; Natco continuous driller No. A-103; Natco universal joints, tap holders and tool holders. Represented by: E. D. Frank, general sales manager, R. E. Sterling, sales representative in Cleveland, and Herschell Fuller, Eastern service representative.

NATIONAL ELECTRIC LIGHT ASSOCIATION, New York. Booth 110. Photographs and engineering data on industrial heating installations. Those in attendance will endeavor to give information and advice on industrial heating installations. Represented by various representatives of industrial heating firms.

NATIONAL EQUIPMENT Co., Springfield, Mass. Booth 259. New type N. B. Kobert riveting machine; N. C. Kobert forging machine. Represented by: George A. Bausman, general manager; F. P. Kobert, consulting engineer; Joel Whitney, Jr., and J. P. Peterson, sales engineers; Charles B. Gowing, mechanical engineer.

NATIONAL TWIST DRILL & TOOL Co., Detroit. Booths 265 and 275. Display of drills, reamers, cutters and special tools; also demonstration of parabolic milling cutters. Represented by: Harry Butler, assistant sales manager; C. Cornwall, salesman; G. Webster, service department.

FRIEDRICH NEUMANN'S SUCCESSORS, Inc., New York. Booth 288. Single Grip twist drill grinding machines; model SPL for grinding twist drills from No. 38 to 3/4 in., model SPK equipped with point thinning device, for grinding twist drills from 3/4 in. to 2 in. Represented by William K. Stamets, territorial representative.

NEW BRITAIN MACHINE Co., New Britain, Conn. Booths 239 and 240. No. 12-A New Britain tool rotating chucking machine; No. 452 New Britain New-matic chucking machine; No. 204 New Britain six spindle automatic screw machine. Represented by: H. H. Pease, president; E. L. Steinle, manager machinery sales; G. K. Atkinson, Ohio representative; T. C. Stirling, Detroit representative; H. L. Wilson, Chicago representative; C. L. Perry, C. Hanson and S. Mayerjack, demonstrators.

NORTON Co., Worcester, Mass. Booth 231 and 241. Norton cylindrical grinding machine in operation; display of grinding wheels; Norton floor products consisting of alundum floor and stair tiles and treads; Norton refractories. Represented by: O. E. Nordstrom, district manager; Eric Hellstrom, demonstrator; Oscar A. Knight, district manager, C. H. Hill, district representative; W. T. Montague, sales manager; G. J. Griffing, assistant sales manager; H. W. Dunbar, assistant general sales manager.

R. D. NUTTALL Co., Pittsburgh. Booth 59. Gears and pinions for various applications, heat treated by the company's process; gears for electric locomotives, rolling mill table mitre drivers, etc. Represented by: Q. W. Hershey, sales manager; J. E. Mullen, assistant sales manager; W. H. Phillips, manager of engineering and works; R. W. Young and W. H. Smith, sales engineers; C. H. Parker, industrial division.

O

OSTERLEIN MACHINE Co., Cincinnati. Booth 289. Motor driven Ohio constant speed milling machine; motor driven Ohio cutter and tool grinder. Represented by George M. Meyncke, sales manager.

OHIO STEEL FOUNDRY Co., Springfield, Ohio. Booth 38. Fahrite heat resisting alloy castings for high temperature applications; carbonizing boxes, annealing boxes, furnace plates, parts for continuous conveyor furnaces, beams, etc. Represented by: T. H. Harvey, vice-president; C. E. Malley, alloy division.

OILGEAR Co., Milwaukee. Booth 226. Ten-ton type PJ Oil-gear press with semi-automatic control. Motor drive, splash pan and cutting lubricant attachment. Represented by: A. L. Ellis, Oilgear Co., at New York; Henry Prentiss & Co., New York and Leon Goodspeed, Hartford, Conn.; Donald Clute and Harold Croll.

OLIVER INSTRUMENT Co., Adrian, Mich. Booth 227. Oliver automatic drillpointer; Oliver point thinner and Oliver die making machine, all operating. Represented by E. C. Oliver, manager.

TINUS OLSEN TESTING MACHINE Co., Philadelphia. Booth 43. Various types of testing machines, including an Olsen autographic universal testing machine with various attachments and tools for conducting special tests, various types of Brinell hardness testing machines and late model hardness tester; special equipment for tension and compression testing, ductility testing machines for sheet metal, lapping machine for polishing; also Olsen-Lundgren fly-wheel balancing machine and Olsen-Carwen static dynamic balancing equipment for rotating parts. Represented by J. Lundgren and W. J. Tretch.

O. K. TOOL Co., Shelton, Conn. Booth 276. Universal grinding machine in operation with special designed OK attachment for regrinding inserted tooth section hobs; motor driven grinding machine with special fixture attached for grinding tools. Represented by: F. J. Wilson, secretary; R. R. Weddell, engineer; R. S. Young, metallurgist; Frederick Schroeder, sales representative.

OXWELD ACETYLENE Co., New York. Booth 161. Demonstration of welding pieces of flange steel together, cutting them into test strips with an oxy-acetylene cutting torch, grinding to size and testing. Represented by: E. E. Thum, manager publicity department and J. W. Dunn, publicity department; also H. H. Dyar, district sales manager, Linde Air Products Co., and J. P. Dawson, Union Carbide & Carbon Laboratories; J. V. Upton.

P

PAERK CHEMICAL Co., Detroit. Booth 111. Heat treating material and cleaning compounds. Represented by: Frank W. Faery, D. W. Bauer and J. N. Bourg, general manager.

PEERLESS MACHINE Co., Racine, Wis. Booth 12. Peerless 9 x 9-in. high speed metal saw; Peerless 6 x 6-in. universal high speed metal saw; Peerless 9 x 9-in. universal high speed metal saw; a 4½-in. x 4½-in. new light type, dry cutting power metal saw. Represented by: R. T. Ingalls, sales manager; Charles Rasmussen, mechanical engineer, and A. H. Goetz, field representative.

HENRY PELS & Co., New York. Booth 231. Triple combined punch, splitting shear, bar, angle and tee cutter, types BmEFGU—No. 13, and BLUEFG—No. 20; combination bar, angle and tee shear with beam and channel cutter, type E F F-26. Represented by T. C. Sternblad, secretary.

PITTSBURGH CRUCIBLE STEEL Co., Midland, Pa. Booth 87. Forging grades of steel, exhibit largely by photographs and charts. Represented by: F. B. Hufnagel, president; R. M. Keeney, general superintendent; A. H. Sonnhalter, assistant general superintendent; O. L. Pringle, superintendent of metallurgy and inspection departments; S. D. Williams, superintendent open-hearth; W. I. McInerney, superintendent heat treating and cold drawn departments; E. T. Walton, chief inspector; W. E. Davis, W. P. Benter and W. R. Howell, metallurgists; W. W. Williams, general sales manager; K. E. Porter, assistant general sales manager; J. N. Critchlow, Detroit sales manager; T. A. Goodridge, Cleveland sales manager; H. T. Harrison, salesman; B. B. Holt, salesman, and Myron Powers, salesman.

PITTSBURGH INSTRUMENT & MACHINE Co., Pittsburgh. Booth 103. Brinell testing machine, impact testing machine; metal sheet tester; metallographic grinder and Buvinger weight calculating instrument. Represented by: Paul Kammerer, general manager, and Charles Truog, secretary.

POTTER & JOHNSTON MACHINE Co., Pawtucket, R. I. Booth 223B. (In operation) 6-C automatic chucking machine; Unimatic machine; 2-M automatic milling machine and a 24-in. universal shaping machine. Represented by N. R. Earle, general sales manager.

PRATT & WHITNEY Co., Hartford, Conn. Booths 277 and 278. Machine tools, small tools and cages. Represented by: E. C. Shultz, publicity manager; W. P. Kirk, sales

manager; A. E. R. Turner and J. J. Heber, Cleveland office; E. J. Sullivan, special representative; G. E. Thomas, Cleveland office; A. H. d'Arcambal, metallurgist and sales engineer.

PRODUCTION MACHINE Co., Greenfield, Mass. Booth 251. Type "A" cylindrical polishing machine; type "F" polishing machine for flat work; type "R" combined disc grinder and polishing machine. (In operation.) Represented by A. H. Behnke, sales manager.

R

REPUBLIC FLOW METERS Co., Chicago. Booths 69 and 70. Indicating and recording pyrometers, with full line of accessories; steam meters, water meters, gas and air meters, coal meters; CO₂ recorders; draft instruments. Represented by: James D. Cunningham, president; G. V. Nightingale, Philadelphia office; A. M. Steever, Detroit office; M. E. Van Vliet, Pittsburgh office; Frank A. Hall, New York office; D. J. Jones, Chicago office; C. C. McDermott, in charge of pyrometer division; L. C. Wilson, Cleveland office.

ROCKFORD MACHINE TOOL Co., Rockford, Ill. Booth 287. Mechanics production drill press, 24-in.; 24-in. Rockford improved variable speed motor. Represented by: M. Monson, superintendent; William K. Stamets.

ROCKFORD MILLING MACHINE Co., Rockford, Ill. Booth 266A. Rockford Rigidmil. Sundstrand 8-in. stub lathe, completely tooled and in operation. Represented by Charles B. De Vlieg and G. A. Markuson.

W. S. ROCKWELL Co., New York. Booth 61. Models of operating furnaces. Represented by: J. N. Voltman and C. D. Barnhart.

RODMAN CHEMICAL Co., Verona, Pa. Booth 84. Carburizing materials, quenching oils, tempering oils, luting clay. Represented by: Hugh Rodman, president; Gordon A. Webb, Detroit district manager; Stanley P. Rockwell, New England representative; W. D. Fuller, New England representative; O. T. Muehlemaier, Rockford, Ill.

ROESSLER & HASSLACHER CHEMICAL Co., New York. Booth 44. Chemicals used in heat treatment and case hardening and coloring of steel; demonstration of cyanide hardening and electroplating; chemicals for copper and zinc electroplating. Represented by: William M. Gager, member research department; C. H. Proctor, electroplating expert; representatives of the Cleveland sales office.

S

SEBASTIAN LATHE Co., Cincinnati. Booth 290. A 15 x 6 geared head motor driven lathe, in operation. Represented by E. E. Stokes, president.

SENECA FALLS MACHINE Co., Seneca Falls, N. Y. Booth 295. Seneca Falls cost cutting turning equipment. "Looswing," plain and semi-automatic, Short-cut production lathes and Star screw-cutting engine lathes. Represented by: E. R. Smith, vice-president and general manager; J. A. Fyfe, secretary; W. H. Nettle, mid-west representative; F. B. Webb, sales engineer; M. C. Day, sales engineer; G. J. Hawkey, the Cleveland Duplex Machinery Co., Cleveland representative for Star and Short-cut lathes.

SIMONDS SAW & STEEL Co., Fitchburg, Mass., and Lockport, N. Y. Booths 72 and 73. Saws of all kinds with a special display of metal cutting saws, both solid and inserted tooth; metal slitting saws, screw slotting saws, machine knives, carbon and high speed steel; also display of various products made of Simonds steel. Represented by: George T. Curtis, H. B. McDonald and H. D. Weed.

SKYBRYTE Co., Cleveland. Booth 109. Skybryte liquid factory glass cleaner. Represented by: T. T. Holt, president, and V. S. Loventhal, secretary.

SPENCER TURBINE Co., Hartford, Conn. Booth 223. A 1507 turbo compressor, 1750 speed, 900 c.f.m. 1½ lb. pressure. A 1010 turbo compressor 1300 cu. ft., 1 lb. pressure, 1750 r.p.m. One 1005 machine, 600 cu. ft. 1 lb. pressure, 3500 r.p.m. Represented by: S. E. Phillips, secretary; H. M. Grossman, sales engineer.

WILLIAM K. STAMETS, Pittsburgh. Booths 282 to 292. Machines and tools manufactured by: Hanson-Whitney Machine Co., Hartford, Conn.; Whitney Mfg. Co., Hartford; Taylor & Fenn Co., Hartford; Lehmann Machine Co., St. Louis; Morris Machine Tool Co., Cincinnati; Ex-Cell-O Tool & Machine Co., Detroit; Rockford Machine Tool Co., Rockford, Ill.; Friedrich Neumann's Successors, New York; Oesterlein Machine Co., Cincinnati; Sebastian Lathe Co., Cincinnati; Henry Pels & Co., New York; Marschke Mfg. Co., Indianapolis; Kelly Reamer Co., Cleveland. Represented by: William R. King, W. H. Barber, George D. Miller, W. E. Tabb and William K. Stamets.

STANDARD TOOL CO., Cleveland. Booth 92. Twist drills, reamers, taps, milling cutters, drill chucks and special metal working tools. Represented by: H. C. McKean, general manager; R. T. Lane, manager of sales; H. Will, superintendent; Clarence Buck, metallurgist; D. L. Northway, purchasing agent; T. E. Northway, secretary-treasurer; J. G. Green, tool expert; D. C. MacMillan, H. R. Hanson, D. R. Higgins, J. G. Green and T. Bascom, master mechanic.

STRONG, CARLISLE & HAMMOND CO., Cleveland. Booths 207 to 216 and 224 to 238. Furnace department, booths 104 and 105. Complete line of machine tools, in operation, made by: Monarch Machine Tool Co., B. C. Ames Co., Heim Grinder Co., Hammond Mfg. Co., Charles G. Allen Co., W. B. Knight Machinery Co., International Machine Tool Co., American Tool Works, Brown & Sharpe Mfg. Co., Oilgear Co., King Machine Tool Co., Bilton Machine Tool Co., Oliver Instrument Co., G. A. Gray Co., National Automatic Tool Co., Strong, Carlisle & Hammond Co., electric and oil furnaces. Represented by: G. S. Peterson, J. Weintz, A. B. Lindsay, T. W. Clark, T. W. Carlisle, G. E. Kruger, Frank Parsons; Detroit and Cleveland representatives also.

STARRETT CO., L. S., Athol, Mass. Booth 94. Fine mechanical tools, steel tapes, hack saw blades and vises. Represented by: D. Findlay, sales manager; Arthur H. Starrett, master mechanic; O. J. Rogers and J. E. Hindes.

SURFACE COMBUSTION CO., New York. Booth 36. Models and designs of furnaces. Represented by: F. W. Manker, vice-president; F. J. Winder, Pittsburgh district manager; C. A. Blesch, engineer Pittsburgh district; A. A. Treadway, Detroit district manager.

SWEDISH CRUCIBLE STEEL CO., Detroit. Booth 27. Nickel alloy and steel castings, carbonizing boxes, lead and cyanide pots; furnace crates; retorts. Represented by: Henry Nixon, metallurgist; S. R. Allen, sales manager.

WILLIAM SWINDELL & BROTHERS, Pittsburgh. Booths 28 and 39. Universal electric heat treating furnaces in operation; photographs. Represented by: E. H. Swindell, treasurer; R. W. Porter, vice-president; F. W. Brooks, chief engineer; G. P. Mills, sales engineer.

T

TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y. Booth 112. Complete line of electrical pyrometer equipment, including the new type high resistance portable and wall type indicators, the dial type indicators, the Thermopyre or portable self-contained unit pyrometer, duplex and single record recording pyrometer, automatic controllers, rotary switches, platinum and base metal thermocouples, thermocouple protection tubes, accessories, etc., recording thermometers, capillary index thermometers, straight and angle stem mercury thermometers, lead bath thermometers, etc. Represented by: H. W. Maurer, Jr., manager Cleveland office; A. H. Goddard, salesman; G. A. Howell, factory representative.

TAYLOR & FENN CO., Hartford, Conn. Booth 283. Two-spindle horizontal spline milling machine; high speed ball bearing vertical milling machine; three-spindle drilling machine, arranged with hand feed, power feed and tapping heads. Represented by: W. K. Stamets, Cleveland representative, and George S. Delany, representative for factory.

THOMPSON GRINDER CO., Springfield, Ohio. Booth 259. In operation, 10 x 36-in. self-contained universal grinder. Represented by H. J. Warrick.

HENRY G. THOMPSON & SONS CO., Hartford, Conn. Booth 60. Milband positive feed metal cutting machine; special exhibit of metal cutting saws. Represented by: Fellows Thompson, general manager; Graham Thompson, vice-president, and T. A. Hyde.

TIMKEN ROLLER BEARING CO., Canton, Ohio. Booth 71. Steel and bearing samples. Represented by: M. T. Lothrop, vice-president; A. J. Sanford, manager steel sales; Charles A. Swan, assistant manager steel sales; Thomas W. Hardy, metallurgist; H. W. McQuaid, metallurgist.

U

UNION TWIST DRILL CO., Athol, Mass. Booths 272 and 273. Milling cutters, hobs, twist drills, reamers, taps, dies and screw plates, grinding machines for sharpening hobs, cutters and twist drills. Represented by: J. H. Horigan, chief engineer; George F. Holland, general manager Butterfield & Co. division; Lawrence H. Laythe, sales manager Butterfield & Co. division; G. C. Stroppe, sales manager S. W. Card division; G. G. Hunter, Ohio representative S. W. Card division.

UNITED ALLOY STEEL CORPORATION, Canton, Ohio. Booths 49 and 50. Various finished automobile, locomotive and

industrial machinery parts; forgings and several rolled axles, made in its plant; demonstration of Enduro rustless iron. Represented by: H. H. Pleasance, sales manager; M. H. Schmid, assistant sales manager; F. W. Krebs, sales department; R. B. Kelley, manager of Cleveland office; J. D. Jones, manager of Detroit office; M. A. Grossmann, metallurgical engineer; N. L. Deuble and C. C. Snyder, metallurgical department.

UNIVERSAL GRINDING MACHINE CO., Fitchburg, Mass. Booth 279. Universal grinding machine and cylindrical grinding machine. Represented by: Robert D. Gould, treasurer, and Gardner S. Gould.

V

VANADIUM-ALLOYS STEEL CO., Latrobe, Pa. Booth 64. High speed, alloy and carbon tool steels. Represented by: Roy C. McKenna, president; W. S. Jones, vice-president; L. D. Moberg, vice-president; J. H. Roberts, eastern sales manager; J. P. Gill, metallurgist; L. D. Bowman, metallurgist; J. H. Caler, A. F. MacFarland, W. R. Mau, R. R. Artz, T. J. Van de Motter and George Reminger.

V. & O. PRESS CO., Hudson, N. Y. Booth 254. No. 41n high speed press equipped with armature disk notching attachment operating at 600 strokes of slide per minute; No. 2 press equipped with double roll feed and scrap cutter, with roll feed, rack driven. Represented by: H. U. Herrick, vice-president and general manager; F. A. Beardsley, sales manager.

W

WALCOTT LATHE CO., Jackson, Mich. Booths 264 and 274. Melling crankshaft contour turning lathe; Melling crank pin turning and finishing lathe; Walcott gear tooth grinder. Represented by: D. G. Kimball, president and general manager; N. R. Townley, vice-president and treasurer; C. H. Sylvester, experimental engineer; R. G. Williams, salesman.

WARNER & SWASEY CO., Cleveland. Booths 262 and 263. 1-A Universal hollow hexagon turret lathe, demonstrating a machining operation; roto pneumatic grinder, showing use of a hand pneumatic grinder. Represented by: A. C. Cook, vice-president; C. J. Stilwell, sales manager; W. K. Bailey, manager, Cleveland; K. L. Pohlman, roto pneumatic grinder sales; J. Craig, demonstrator.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa. Booths 96 and 97. Electric furnaces of late design in operation; melting pot and various interesting details of electric furnace construction. Represented by: Wirt S. Scott, manager industrial heating section; R. T. Ruttencutter, industrial heating section; F. G. Allen, industrial heating engineer; M. R. Armstrong, industrial heating section; H. H. Sugg, industrial heating section; J. F. Sweeney, Jr., publicity department.

WHELOCK, LOVEJOY & CO., Inc., Cambridge, Mass. Booths 80 and 91. Hy-ten alloy steels and Whelco tool steels, representing processes of manufacture, heat-treatment and application to special machine parts. Represented by: A. Oram Fulton, president; Frederick H. Lovejoy, vice-president; Edwin E. Bartlett, district manager Cleveland; George A. Barch, Clement H. Williams and Francis W. Blosser, sales department, Cleveland; Edwin P. Gaffney, district manager, New York; Thomas W. Knight, sales department, New York; Leroy P. Needham, district manager Chicago; Floyd J. Devan and Austin R. Townsend, sales department, Chicago.

WHITNEY MFG. CO., Hartford, Conn. Booth 282. Chains and sprockets for power transmission. Represented by: C. E. Wertman, sales manager; D. I. Wheeler, sales engineer; Stiles C. Smith, sales representative.

WILMARTH & MORMAN CO., Grand Rapids, Mich. Booth 243. No. 78 surface grinder, motor driven; No. 3 surface grinder; No. 1 surface grinder; No. 1 universal cutter and tool grinder, motor driven; No. 99 plain universal cutter and tool grinder, belt driven, less all attachments and countershaft; type B, point improved New Yankee drill grinder, motor driven. Represented by: Charles H. Slaughter, sales manager, and Arthur Williams, general superintendent.

WILSON-MAEULEN CO., New York. Booth 25. Rockwell direct reading hardness tester, including new models 4-B and 5-D of large capacity; new Universal model recently developed for automobile cylinder blocks and other large work; recording and indicating pyrometers, including new model recorder; recording and indicating resistance bulb electric thermometers; new line of precision equipment for temperatures from 40 deg. below zero to 900 deg. F.; automatic temperature control equipment; automatic electrical compensator for pyrometer cold junctions. Represented by: J. P. Roberts, Cleveland; C. E. Hellenberg, Detroit; H. Lee, Pittsburgh.

Machinery Markets and News of the Works

MORE LARGE BUYING

Hudson Motor Car Co. Places Order for 40 Turret Lathes

Resumption of Railroad Buying and Increase in Inquiries Raises Hopes for September

ANOTHER large order from the Hudson Motor Car Co., Detroit, featured the week's machine tool business. The order, which was for 40 turret lathes, went to a Cleveland manufacturer. The Dayton Engineering Laboratories, Dayton, Ohio, ordered 10 turret

lathes. An order from France for 20 automatic screw machines was received by a Cleveland company.

Indications point to a resumption of railroad buying. The Wabash bought six lathes and a car wheel borer, and orders of lesser importance have been placed by the Big Four, Rock Island, Cleveland, Cincinnati, Chicago & St. Louis, Union Pacific and Chicago, Milwaukee & St. Paul. A list from the Illinois Central for its Paducah, Ky., shops is expected, but no word has been given out as to when it will be issued.

The last two weeks of August brought no increase in business generally, but there has been a noticeable increase in the number of inquiries, and hopes for better business this month are entertained by the trade.

New York

NEW YORK, Sept. 1.

INQUIRIES have increased in number, and from this fact local machine tool sellers derive hope for an upward swing in the volume of orders during the next few months. Business continues fairly good for mid-summer, but there has been no noticeable gain in orders over those received in July. The Union Tank Car Co., through its purchasing department in New York, has placed an order for an axle lathe with the Niles-Bement-Pond Co., the machine to be shipped to its shops at Whiting, Ind. The Cleveland, Cincinnati, Chicago & St. Louis Railroad has bought a 44-in. car wheel borer.

The Meurer Steel Barrel Co., Borden Avenue, Long Island City, has plans for an addition to cost about \$50,000, including improvements in the present plant. L. Allmendinger, 20 Palmetto Street, Brooklyn, is architect.

The Consolidated Wire & Associated Corporations, 309 Fifth Avenue, New York, have inquiries out for a quantity of insulated copper wire.

The New York, New Haven & Hartford Railroad Co., Grand Central Terminal, New York, will soon begin superstructure for its proposed car repair shop at Van Nest, N. Y., to cost \$65,000.

The Brillo Mfg. Co., Pearl and Tillary Streets, New York, manufacturer of steel wool, etc., has acquired the former foundry of the E. W. Bliss Co., Plymouth Street, Brooklyn, on site 115 x 200 ft., and will remodel the structure for a new plant. It is purposed to remove the present works to the new location.

George M. McCabe, 96 Fifth Avenue, New York, architect, has preliminary plans for a one-story automobile service, repair and garage building, 115 x 176 ft., on Ogden Avenue, to cost approximately \$60,000.

Bids will soon be asked by the Knox Hat Co., Atlantic Avenue, Brooklyn, for a new power plant, for which plans are being prepared by Fletcher & Thompson, Inc., 350 Madison Avenue, New York, engineer. It will cost about \$75,000, including proposed factory improvements.

The New York Transfer Co., 263 Fifth Avenue, New York, has filed plans for a one-story and basement automobile service, repair and garage building, 100 x 150 ft., at 605-15 West Forty-second Street, estimated to cost \$120,000. Samuel F. Draper is president.

The Highland Motor Co., Glen Cove, N. Y., local representative for the Packard automobile, has plans for a two-story service, repair and garage building, 50 x 92 ft., to cost about \$50,000. M. W. Housman, 172 Jamaica Avenue, Jamaica, N. Y., is architect.

Following the purchase of the 17-mile pipe line of the Prairie Oil & Gas Co., in the Craig field, vicinity of Casper, Wyo., by the Texas Co., 17 Battery Place, New York, the last noted company is reported to be considering the construction of a new oil refinery in northern Colorado.

The Ajax Electric Hammer Corporation, 1767 Broadway, New York, has leased space in the building at 117 West Sixty-third Street for new works.

Paul Hirschman, Second and Main Streets, Hudson, N. Y., is considering the construction of a two-story automobile service, repair and garage building, 46 x 110 ft., to cost about \$50,000.

The Toms River Co., Toms River, N. J., has plans underway for a steel standpipe, 25 ft. in diameter and 105 ft. high, with a capacity of about 400,000 gal., estimated to cost \$20,000.

The Board of Education, Hammonton, N. J., plans the installation of manual training equipment in its proposed new high school estimated to cost \$250,000, for which bids have been asked on general contract.

George J. Cross, 421 Elm Street, Arlington, N. J., manufacturer of fountain pens, etc., has awarded contract to Enstice Brothers, 111 Academy Street, Newark, for a two-story and basement factory, 80 x 80 ft., on Schuyler Avenue, Kearny, N. J. Henry D. Scudder, Jr., Union Building, Newark, is architect.

Fire, Aug. 27, destroyed a portion of the works of Dey Brothers, Hightstown, N. J., manufacturers of plumbing and heating equipment. An official estimate of loss has not been announced. It is planned to rebuild.

Robert E. Wilson, 311 Stephen Street, Belleville, N. J., is in the market for a 75 to 100-hp. boiler, complete with accessories.

The Jersey Central Power & Light Co., Allenhurst, N. J., will make extensions and improvements in its plant and system in the Atlantic Highlands district to cost about \$250,000.

The Stutz Motor Co. of America, Inc., Broad and Kinney Streets, Newark, has leased the building at 54-56 Stanton Street for a new service, repair and garage branch. David Jones is local manager.

Baker & Co., Inc., 54 Austin Street, Newark, metals, has awarded a contract to Sutherland & Allen, Inc., 14 Park Place, for a one-story plant, 50 x 113 ft., at New Jersey Railroad Avenue and Emmet Street, for refining and other service, estimated to cost \$30,000. Fred A. Phelps, 21 Fulton Street, is engineer.

The Public Service Corporation, Terminal Building, Newark, has acquired the branch plant of the Autocar Co., Ardmore, Pa., totaling 85,000 sq. ft., for a service, repair and parts plant for motor buses. The Autocar Co., will remove the majority of equipment to its Ardmore works, retaining a portion of the Newark structure for a general service and repair branch.

Fire, Aug. 26, destroyed a portion of the plant of the United Box Board Co., Whippany, N. J., with loss reported in excess of \$35,000. Rebuilding plans are under advisement.

The Warren Mfg. Co., 342 Madison Avenue, New York, manufacturer of paper products, will proceed with the erection of a three-story addition to its mill at Riegelsville, N. J., 70 x 130 ft. It will also build a two-story addition to its mill at Warren's Mills, N. J., 70 x 80 ft. Contract for both structures has been awarded to the H. K. Ferguson Co., Cleveland.

The Crane Market

BUSINESS is quiet. Sales of the week, excepting six 5-ton cranes bought by the American Locomotive Works, consisted of several single purchases. It was denied that the Pennsylvania Railroad closed for two cranes, as has been reported. New inquiries are slow. Business awaiting action includes 15 electric overhead cranes for the Andes Copper Mining Co. and five 1-ton, two-motor electric hoists and one 2-ton electric hoist for the Long Island Railroad. Other railroad lists, some of which have been out several weeks, are yet to be placed, though it is understood that recommendations have been made in the case of the Pennsylvania.

Recent purchases include:

Six five-ton electric cranes for the American Locomotive Co., from the Whiting Corporation, 136 Liberty Street, New York.

B. Schatz & Sons, New York, a five-ton electric crane from the Shepard Electric Crane & Hoist Co.

Public Service Production Co., New York, a special 10-ton gantry crane from the Shaw Electric Crane Co.

Hudson Motor Car Co., an electric crane from the Chesapeake Iron Works.

James B. Linnehan Stone Yards, New York, a 10-ton

electric crane, 65-ft. span, from the Shaw Electric Crane Co.

Stone & Webster, Inc., Boston, has purchased a 75-ton Northern crane for a Texas power house.

Chicago, Rock Island & Pacific, 50-ton electric drop pit table for Dalhart, Tex., from the Whiting Corporation.

Illinois Central, 200-ton locomotive hoist for Markham yard, Chicago, from the Whiting Corporation.

Wisconsin Steel Co., Chicago, one 60-ton and one 15-ton electric traveling crane from the Morgan Engineering Co.; also two 20-ton and one 15-ton electric traveling crane from the Cleveland Crane & Engineering Co.

City of Chicago, one 7½-ton and one 20-ton, three-motor, traveling crane to Page & Ludwick, Chicago, representing Milwaukee Electric Crane & Mfg. Co.

Inquiries include:

Andes Copper Mining Co., New York, 15 electric overhead cranes for Chile. Specifications call for six 25-ton, two three-ton, two five-ton, two 15-ton and two special cranes.

Several cranes for the Weirton Steel Co., Weirton, W. Va., and for the Carnegie Steel Co., Duquesne, Pa.

The Hackley-Morrison Co., 1708 Lewis Street, Richmond, Va., is inquiring for an electric traveling crane, 10 to 15 ton capacity, 40 to 60 ft. span with 100 ft. runway.

The De Mattia Foundry & Machine Co., Wellington Street and Getty Avenue, Clifton, N. J., has let contract for an 80-ft. extension to its foundry buildings. This, together with a through crane way that will be added in the yard, will give the company a modern building, 70 x 240 ft., with 2 cupolas and an approximate daily capacity of 20 tons of gray iron castings.

The Baldwin Aerifactor Oil Burner Co., care of J. E. Cleveland, 149 Broadway, New York, organized with \$100,000 capital stock, will manufacture a patented oil burner.

The Universal Motor Equipment Co., 26 Somme Street, Newark, organized with \$100,000 capital stock, will manufacture brakeshoes, radiator caps and other automotive accessories. Die casting and general machine work are done in its plant. It is in the market for die casting metal, tool steel, cold rolled steel, bronze, etc. B. B. Sugerman is one of the heads.

New England

Boston, Aug. 31.

AUGUST was a poor month with virtually all local machine tool houses. In a few instances however, sales were larger than in July. The feeling persists that September will show quite an improvement in business, although it is reported inquiries have dropped to small proportions. A 6-ft. radial drill taken by the Boston & Albany Railroad and a combination lathe, drill and milling machine for a Tampa, Fla., interest were the most important sales the past week. New England shops doing work for Middle West automobile manufacturers are inquiring for milling machines. Interest in used machine tools centers in the sale of excess equipment of the Taft-Peirce Mfg. Co., Woonsocket, R. I. More than 50 of these tools have been placed, largely with used tool dealers.

The growing activity in shop production is attested by the continued free movement of small tools and machine tool parts. August sales of small tools exceeded those for July. During the past week the demand for gages was particularly good.

The Boston & Albany Railroad, Boston, has purchased a 6-ft. radial drill from the Niles-Bement-Pond Co.

The Dennison Mfg. Co., Howard Street, Framingham, Mass., engineers, are preparing plans for a contemplated manufacturing plant.

The Bath Iron Works, Bath, Me., is to be sold at public auction as a result of foreclosure proceedings. The date of the sale has not been fixed.

Preliminary steps have been taken by the Fafnir Bearing Co., New Britain, Conn., for the erection of a six-story, 60 x 160 ft. plant.

The General Electric Co., West Lynn, Mass., has awarded contract for a one-story, 55 x 100 ft. forge shop. Charles W. Wright, 23 Central Street, Lynn is the contractor.

Construction has started on a two-story, 43 x 152 ft.

addition for the Spencer Turbine Co., Hartford, Conn., organ blowers, central cleaning systems, turbo-compressors, etc. The first floor will be used for manufacturing and the second for offices.

The Max Ams Chemical Engineering Corporation, capitalized for \$99,000 is in the process of formation to manufacture artificial silk machinery. The machines have an overall length of 62 ft. The company will be an outgrowth of the Max Ams Machine Co., Bridgeport, Conn., cons.

Heavy locomotive repair work heretofore conducted at the Boston & Maine Railroad, Concord, N. H., shops hereafter will be done at the Billerica shops. Light running locomotive repairs will be continued at the company's new engine shop, and repair work on work trains and other equipment in the old erecting shops at Concord. It is also planned to concentrate at Concord steel freight car equipment repairs.

The Connecticut Co., West Main Street, Waterbury, Conn., has plans for a one-story traction car repair, reconditioning and storage works to cost about \$400,000. R. W. Foote, 185 Church Street, New Haven, Conn., is architect.

The Eastern Malleable Iron Works, Naugatuck, Conn., is planning for the installation of a new furnace to replace its No. 3 unit.

The North Terminal Corporation, Burroughs & Co., 30 Kilby Street, Boston, has broken ground for a two-story and basement automobile service, repair and garage building, estimated to cost \$450,000 with equipment.

The Worcester Concrete Block Co., Worcester, Mass., care of F. A. MacNiven, 363 Main Street, architect, has plans for a one-story factory to cost about \$45,000 with equipment.

The Great Northern Paper Co., Madison, Me., will make extensions and improvements in the power plant at its Dolby Mills, with the installation of additional equipment to develop 7800 hp.

The Norfolk Woodworking Co., Braintree, Mass., is having plans drawn for a one-story works, 50 x 145 ft. at Atlantic, Mass. L. S. Joslin, 339 Newbury Street, Boston, is architect.

The White Motors, Inc., New Haven, Conn., has leased a building, one-story, 152 x 190 ft., to be erected on Davenport Avenue, for a new service, repair and garage, reported to cost \$60,000. R. W. Foote, 185 Church Street, is architect.

The Draper Corporation, Hopedale, Mass., manufacturer of textile machinery, has foundations under way for its two-story and basement plant at Beebe River, N. H., 100 x 200 ft., to cost \$175,000 with machinery.

The G. F. Wright Steel & Wire Co., Worcester, Mass., will install additional machinery to increase the output about 10 per cent. The expansion program will be completed by the end of the year.

The Hedason Mfg. Co., New Haven, Conn., manufacturer of screw machine products, will build a one-story addition to its plant on State Street, 38 x 140 ft. W. J. Smith, Derby, Conn., is architect.

The E. F. Keating Pipe Bending Co., Hartford, Conn., will proceed with the erection of a one-story addition, 60 x 100 ft., on Brook Street, West Hartford.

The Rumford Falls Power Co., Rumford, Me., will make

extensions and improvements in its hydroelectric power plant, with the installation of additional machinery.

M. L. Minor, 60 Pemberton Square, Boston, architect, has plans for a two-story automobile service, repair and garage building, 80 x 240 ft., at Brockton, Mass., to cost about \$175,000.

The Board of Education, Cranston, R. I., will install manual training equipment in a three-story high school, estimated to cost \$750,000, on which bids are now being taken. William R. Walker & Son, 49 Weybosset Street, Providence, are architects.

Emery W. Jones, 8 Elbridge Street, Worcester, Mass., is representing several contractors in Worcester who are disposing of their surplus equipment, including a large quantity of railroad equipment.

Philadelphia

PHILADELPHIA, Aug. 31.

BIDS are being asked on a general contract until Sept. 10 by the Atwater Kent Mfg. Co., Roberts Avenue and Abbottsford Road, Philadelphia, manufacturer of radio equipment, for a one-story and basement addition, 119 x 225 ft. The Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

The Dodge Steel Co., State Road, Philadelphia, has filed plans for a one-story steel and iron-working shop.

Ovens, power equipment, conveying and other machinery will be installed in the proposed plant to be erected by the Freihofer Baking Co., Twentieth and Indiana Streets, Philadelphia, on property, 240 x 500 ft., acquired at Phillipsburg, N. J., to cost \$150,000.

The Millard F. Wilfong Iron Works Co., Fifty-second Street and Grays Ferry Avenue, Philadelphia, has engaged Heacock & Hokanson, 1218 Chestnut Street, architects, to prepare plans for rebuilding its one-story foundry, recently destroyed by fire, for which bids will soon be asked on general contract. J. R. Wilfong is president.

The Roberts & Mander Stove Co., Eleventh and Washington Streets, Philadelphia, has begun the erection of another unit at its plant at Hatboro, reported to cost more than \$75,000 with equipment. The company is said to be planning to remove its Philadelphia works to this location in the near future.

The Kohler Co., Kohler, Wis., manufacturer of sanitary ware, has closed negotiations for the purchase of the plant of the Cochran-Drugan Co., Hutchinson's Mills, near Trenton, N. J., devoted to a similar line of production, and will establish a branch plant here. Extensions will be made and additional equipment installed.

The Haverford Township School Board, Haverford, Pa., plans the installation of manual training equipment in its proposed two-story and basement high school on the Cooper-town Road, Brookline, Pa., estimated to cost \$225,000, for which bids are being asked on general contract until Sept. 8. Boyd, Abel & Gugert, Otis Building, Philadelphia, are architects.

The Chambersburg Auto Co., Chambersburg, Pa., D. G. Pfoutz, general manager, has plans for a one and two-story service, repair and garage building, 40 x 200 ft., to cost \$45,000 with equipment. Horace G. Kilmer, Trust Co. Building, is architect.

The Reading Bone & Fertilizer Co., Ridgewood, Reading, Pa., is planning for the early rebuilding of the portion of its fertilizer manufacturing plant destroyed by fire Aug. 25, with loss estimated at \$150,000 including machinery.

The Ford Motor Co., Detroit, will soon ask bids for its proposed one-story assembling plant, 450 x 800 ft., at Chester, Pa., using a portion of the former property of the Sun Shipbuilding Co., recently acquired. Albert Kahn, Inc., Marquette Building, Detroit, is architect. The company is said to be planning to use a part of the Sun shipyard for the scrapping of Government vessels lately purchased by Henry Ford and will install facilities for this work.

The V. H. Steckel Motors, Inc., 302 South West Street, Allentown, Pa., is said to be planning a three-story service, repair and garage building, 85 x 110 ft., to cost \$100,000 with equipment. V. H. Steckel is head.

Fire, Aug. 27, destroyed a portion of the plant of the Ringen Brick Mfg. Co., Bethlehem, Pa., with loss reported at \$75,000 including machinery. It is proposed to rebuild immediately.

The Board of Education, Bloomsburg, Pa., plans the installation of manual training equipment in its proposed two-story and basement senior and junior high school estimated to cost \$125,000, for which foundations will soon be laid. Ritter & Shay, Fifteenth and Chestnut Streets, Philadelphia, are architects.

The Board of Education, Allentown, Pa., plans the in-

stallation of manual training equipment in its proposed central junior high school to cost more than \$250,000, for which bids are being asked on a general contract until Sept. 8. Ruhe & Lange, 10 North Sixth Street, are architects.

The Common Council, Bath, Pa., will make extensions and improvements in the municipal water system, to include the installation of pumping machinery and auxiliary equipment.

The Swayze Folding Box Co., Canton, Pa., plans to build a two-story addition for which equipment will be needed.

The Vulcan Iron Works, Wilkes-Barre, Pa., suffered a fire loss of about \$75,000 on Aug. 27, but damage was confined to the iron foundry and all of the patterns were saved. The company has two other iron foundries and the work which was in progress in the destroyed building has been transferred to the other buildings.

Chicago

CHICAGO, Aug. 31.

FROM the standpoint of sales the last week in August was unusually quiet in the local machine tool trade, but a notable revival of inquiry, diversified in character and emanating from a wide range of industries, has raised hopes for an active September. Individually most inquiries are small, calling for one or two machines, but in the aggregate form a pending list of considerable proportions.

Automobile manufacturers in this territory are confining their purchases to occasional orders to round out existing shop facilities. The Nash Motors Co. continues to buy from time to time and the Studebaker Corporation placed several orders during the week. Among the railroads, the Chicago, Milwaukee & St. Paul has completed purchases against its recent list, while the Union Pacific has placed orders for an 18-in. lathe and a centering machine. No definite word has yet been received as to when the Illinois Central will issue a list for its new Paducah, Ky., shops. Sales of used equipment have recently been of fair proportions, but total sales of new tools for August were disappointingly small, probably the smallest for any month thus far this year.

The Rock Island has bought a 3400-lb. steam hammer from the Niles-Bement-Pond Co.

The Chesapeake & Ohio Railroad has awarded a general contract for a shop at Huntington, W. Va., to Henry Milo, Cincinnati, and not to Joseph E. Nelson & Sons, as previously reported. The crane equipment includes a 50-ton 87-ft. 5½-in. span 6-motor crane, and two 15-ton 46-ft. 6½-in. span 3-motor cranes.

The Jordan Machine Tool Co., Minneapolis, Minn., manufacturer of cylinder regrinding equipment, is constructing an addition to its plant at 1850 East Twenty-eighth Street to cost \$40,000.

A. Finkl & Sons, 1326 Cortland Street, Chicago, are having plans prepared for a one-story machine shop, 100 x 200 ft.

The Chicago Nipple Mfg. Co., 1966 Southport Avenue, Chicago, has purchased the Cenco Mfg. Co. of Chicago, maker of steel floor and ceiling plates, perforated hanger bars and kindred fabrications. It is planned to remove the new branch to larger quarters.

The Carter-Mayhew Mfg. Co., Minneapolis, Minn., manufacturer of grain cleaning machinery, has plans under way for an addition to its plant at 663 Nineteenth Avenue.

The plant of the Western Land Roller Co., Hastings, Neb., was recently damaged by fire. The loss was covered by insurance and it is reported repairs will be made immediately.

The American Steel Wheel Corporation, 538 First National Bank Building, Chicago, has been incorporated to manufacture patented pressed-steel artillery wheels for automobiles and also washers such as are used in timber construction. It will lease or purchase a plant of 40,000 sq. ft. under roof, with railroad track facilities, in the vicinity of a supply of steel sheets. A location in Illinois is preferred. Machine tool requirements will be one 200- and one 400-ton mechanical press, several smaller presses, complete tool-room equipment for making dies, and turret lathes or automatics for the production of wheel hubs. Baking ovens for enameling will also be required.

H. Z. Mallen & Co., 4235 West Lake Street, Chicago, manufacturers of furniture, have awarded contract for a five-story factory, 50 x 104 ft., at 1533-49 Arbour Place, to cost \$100,000.

The American Iron & Wire Works, is having plans prepared for a two-story addition, 35 x 150 ft., at 1600 Carroll Avenue, Chicago, to cost \$40,000.

The Oakland Plating Works, 3214 Wentworth Avenue, Chicago, has leased a three-story building at the corner of Twenty-third and LaSalle Streets for five years.

The A. F. Anderson Iron Works, Inc., 5844 Loomis Avenue, Chicago, will begin excavations for a one-story and basement steel fabricating plant, 125 x 220 ft., to cost close to \$500,000 with machinery. A. F. Anderson is president.

The Iowa Railway & Light Co., Cedar Rapids, Iowa, is planning to rebuild the portion of its local power house destroyed by fire Aug. 18, with loss estimated at \$25,000 including equipment.

The Hardstone Brick & Engineering Co., Merchants' National Bank Building, St. Paul, Minn., will begin the construction of a new plant in the South Park district, with machinery installation to develop an output of about 1,500,000 brick per month. It will cost \$200,000 including equipment. John R. Schmitt is president.

The Northwestern Barb Wire Co., Sterling, Ill., has awarded a general contract to the Austin Co., 160 North La Salle Street, Chicago, for its two-story and basement addition, 80 x 140 ft., to cost \$50,000. The contractor has acted as architect for the work.

The Victor Mfg. & Gasket Co., Menard Avenue and Twelfth Street, Chicago, manufacturer of gaskets and other power house equipment, has awarded contract to the Schmidt Brothers Construction Co., 22 East Huron Street, for a three-story plant, to cost approximately \$100,000 with equipment.

The Board of Education, Gothenberg, Neb., plans the installation of manual training equipment in its proposed two-story and basement high school estimated to cost \$150,000, for which bids are being asked on a general contract until Sept. 9. Davis & Wilson, 525 South Thirteenth Street, are architects.

The Huegel Nugent Petroleum Co., 4812 South California Avenue, Chicago, has filed plans for a one-story oil compounding plant, 60 x 195 ft., to cost \$65,000. R. Newberry, 160 North La Salle Street, is architect.

The City Council, Nashua, Mont., is considering tentative plans for a new municipal electric light and power plant.

Pittsburgh

PITTSBURGH, Aug. 31.

FEW sizable machine tool orders are being placed, but sales of single tools reach a fairly good aggregate and total business is up to the average of other recent years at this season. The Kelly Axe & Tool Co., Charleston, W. Va., was a recent buyer of four friction board drop hammers.

Plans are under way for a five-story and basement addition, 30 x 50 ft., to the plant of the Standard Sanitary Mfg. Co., Bessemer Building, Pittsburgh, at New Brighton, Pa., estimated to cost \$55,000. Bernard H. Prack, Martin Building, is architect. The company has acquired the plants and business of the Pacific Sanitary Mfg. Co., San Francisco, and will consolidate with its organization. Expansion will be carried out in Pacific Coast plants, including the installations of additional equipment.

The Vulcan Mold & Foundry Co., Latrobe, Pa., is making improvements in the local plant of the Peerless Foundry, recently acquired, to include the installation of an electric furnace and other equipment. It is purposed to have the branch ready for service before the end of September.

The Latrobe Steel Co., Latrobe, Pa., is taking bids for a one-story addition, 60 x 400 ft., to cost about \$85,000 with equipment.

The Board of Education, Midland, Pa., plans the installation of manual training equipment in a new two-story and basement senior and junior high school estimated to cost \$300,000, for which bids have been asked on a general contract. W. G. Eckles, Lawrence Savings & Trust Building, New Castle, Pa., is architect.

The H. F. Watson Co., Erie, Pa., manufacturer of roofing products, etc., has acquired property, 165 x 918 ft., adjoining its branch plant at Chicago, Western Avenue, near Fifty-second Street, for \$140,000. It will be used for an addition to double the present capacity and work will probably begin sometime this fall.

The Guyan Machine Shops, Logan, W. Va., machinery dealers, have inquiries out for a turret lathe, suitable for handling brass, malleable iron, etc., up to 2½ in. in diameter; also for a number of m'ne cars, 44-in. gage; steel plates, sheets and bars and a shearing and punching machine for handling ¾-in. plate.

The Consolidated Light, Heat & Power Co., Huntington,

W. Va., has tentative plans for extensions and betterments, including the installation of coal-handling equipment and other apparatus. Frank B. Lawton is general superintendent.

The Huntington Forge & Machine Co., Huntington, W. Va., has started the production of an incinerator suitable for home use. Erection of a factory is contemplated. Harry Burtless is manager.

The Ajax Iron Works, Corry, Pa., manufacturer of steam engines, has awarded contract to Frank Jones, local, for a one-story addition to its Washington Street plant.

Buffalo

BUFFALO, Aug. 31.

PLANs have been filed by the Rome Wire Works, Inc., 566 Clyde Avenue, Buffalo, for a one-story addition to cost approximately \$18,000. Headquarters are at Rome, N. Y.

Oneida Community, Ltd., Oneida, N. Y., manufacturer of plated ware, etc., will erect an addition to the plant of its Canadian subsidiary at Niagara Falls, Ont., to cost approximately \$85,000 with equipment.

The American La France Fire Engine Co., Elmira, N. Y., manufacturer of motor-driven fire apparatus, has awarded a general contract to Frederick H. Johnson, 306 West Church Street, for a one-story addition, 65 x 100 ft., to be used primarily as a heat-treating plant.

The Huntley Mfg. Co., Silver Creek, N. Y., manufacturer of canning factory machinery, has acquired the plant and equipment of Paul DeLaney Co., Brocton, N. Y., at a bankruptcy sale, for \$133,000. The new owner will make improvements and plans to remove the Silver Creek works to this location, where the capacity will be considerably increased.

The Power Corporation of New York, Buffalo, recently formed by a merger of local utilities, is negotiating with the International Paper Co., New York, for the purchase of power from its hydroelectric generating stations, and will build automatic power substations and transmission lines for distribution.

The Board of Education, Richburg, N. Y., plans the installation of manual training equipment in its proposed two-story high school estimated to cost \$125,000, for which bids will soon be asked. W. E. Schoenberg, First National Bank Building, Olean, N. Y., is architect.

Calvin P. Wadley, 119 Clinton Street, Buffalo, will erect a one-story plant, 65 x 179 ft., for the manufacture of hot water heaters.

The Ingersoll-Rand Co., 11 Broadway, New York, manufacturer of mining machinery, air compressors, etc., has plans for an addition to its works at Painted Post, N. Y.

The City Council, Gouverneur, N. Y., has completed plans for a one-story municipal electric light and power house, 22 x 35 ft. Lewis C. Reynolds, 387 Castle Street, Geneva, N. Y., is engineer.

The Trico Products Co., 624 Ellicott Street, Buffalo, manufacturer of automobile equipment, is taking bids for a one-story addition, 30 x 132 ft. George Goetz, 329 Humboldt Parkway, is architect.

The Morrison Machine Products Co., Rochester, N. Y., manufacturer of collets for automatic screw machines, after Sept. 9 will be located at Eldredge Park, Elmira, N. Y., where a building recently acquired is now being equipped. It is planned to double the present output of the company within a year. D. G. Anderson and L. R. Evans head the company.

The Walsh Furniture Corporation, Carthage, N. Y., has filed plans for a three-story addition, brick and steel, 60 x 150 ft.

Detroit

DETROIT, Aug. 31.

THE Advance-Rumley Co., Battle Creek, Mich., manufacturer of agricultural machinery, has awarded a contract to S. B. Cole, Battle Creek, for a one-story addition to cost \$30,000 with equipment. Headquarters are at La Porte, Ind.

The Morrison Metal Stamping Co., Jackson, Mich., has work under way on an addition to increase the floor space approximately one-third. A general contract recently was let to the H. K. Ferguson Co., Euclid Avenue, Cleveland. Considerable additional equipment will be installed.

The Detroit Concrete Receptacle Co., 4225 Michigan Avenue, Detroit, has tentative plans for an addition to cost close to \$40,000 with equipment.

The Challenge Refrigerator Co., Grand Haven, Mich., has awarded contract to Fred Janker & Son, Grand Haven, for a two-story addition, 65 x 210 ft., estimated to cost \$50,000.

The Wave Radio Corporation, Royal Oak, Mich., recently organized with a capital of \$25,000, has leased a local

building and will soon begin the manufacture of radio sets and equipment. Proctor Brevard and Charles Stellwater head the company.

The Board of Education, Jackson, Mich., plans the installation of manual training equipment in connection with a proposed new school to cost \$1,200,000. A bond issue in this amount has been approved.

The Calumet & Hecla Mining Co., Calumet, Mich., has begun the enlargement of its No. 23 furnace and will install equipment to develop the plant to about 200 tons per day. It will be extended later to handle practically all the mineral production from the Calumet properties, covering both smelting and refining.

The City Council, Flint, Mich., will soon ask bids for a one-story sewage pumping plant on Gilkey Creek, estimated to cost \$100,000 with machinery. George M. Osborn, City Hall, is consulting engineer.

The Tide Water Oil Sales Corporation, 4612 Woodward Avenue, Detroit, has awarded a general contract to the Malow Berry Co., 2631 Woodward Avenue, for a new one-story storage and distributing plant to cost \$75,000 with equipment. E. L. Hoeber is general manager.

The Wolverine Tube Co., 1411 Central Avenue, Detroit, manufacturer of brass and copper tubing, etc., has awarded a general contract to the Jones-McNally Co., 1200 Washington Boulevard, for a two-story addition, 60 x 200 ft., to cost \$50,000. Carey & Esselstyn, Hoffman Building, are architects.

The National Production Co., Benson and Bellevue Avenues, Detroit, manufacturer of mechanical specialties, is planning a one-story addition.

The Stewart-Warner Speedometer Co., 1826 Diversey Boulevard, Chicago, has plans for a two-story service and repair branch, 100 x 150 ft., at Cass and Burroughs Avenues, Detroit. Murphy & Burns, Detroit, are architects.

The H. B. Sherman Mfg. Co., Barney Street, Battle Creek, Mich., manufacturer of metal goods, has awarded a general contract to R. G. Phelps, 731 Maple Avenue, for a one-story addition, 115 x 197 ft., to be equipped as a brass foundry, and remodeling an existing building, to cost \$100,000 with equipment. L. J. Sarvis, 65 East Main Street, is architect. H. C. Sherman is president.

The Excel Mfg. Co., Allegan, Mich., is planning to purchase machinery for the manufacture of excelsior. A local factory has been acquired.

Cincinnati

CINCINNATI, Aug. 31.

RESUMPTION of railroad buying stimulated sales of machine tools the past week. The Wabash Railroad purchased six lathes from a local builder and a 48-in. car wheel borer from the Niles-Bement-Pond Co. The latter company booked an order for a similar machine from the Big Four Railroad. This carrier is now in the market for considerable equipment for which it is expected to close shortly. While the volume of machine tool orders has fallen off somewhat in the past two weeks, the decrease is attributed solely to the vacation season. Executives of local plants agree that more men are being employed than at any time for several years and production continues at a most encouraging rate. Automobile makers are still placing business in considerable quantities.

Several orders for planers have been received by local builders. Inquiries indicate that sales will be accelerated in the immediate future. The Delco Light Co., Dayton, Ohio, which recently bought four steel press brakes, has closed for another. Companies in Maryland and Ohio also placed orders here for steel press brakes. Shaper manufacturers report that sales have been good. The Wabash Railroad bought a shaper from a local company and the John Steptoe Co. booked a 20-in. motor-driven shaper for New York City delivery. Lathe builders state that sales have dropped off recently. The Rahn-Larmon Co. received an order for an extension gap lathe for shipment to Porto Rico. Production of radial and upright drills is above normal for this time of the year. Several orders for turret lathes have been placed with local manufacturers, but sales for August are below those for July. The New York Central Railroad is inquiring for several turret lathes. Sales of milling machines have held up well throughout the summer.

Forest E. Roof, South Spring Street, Columbus, Ohio, will erect a garage and repair shop, 70 x 150-ft. Shilling Eastman, Columbus, are preparing the plans.

The Northern Garage Co., Nashville, Tenn., has awarded a contract to G. B. Howard & Co., Shelby Avenue, for a

three-story service, repair and garage building, with foundations to carry two additional floors later, estimated to cost \$75,000. Tisdale & Stone, Independent Building, are architects.

The Kentucky Power Co., Augusta, Ky., has plans for a one-story addition to its steam-operated electric power plant at Carrollton, Ky., to cost \$80,000 with equipment. Barrett Waters is general manager.

The Williams Mfg. Co., Watertown, Tenn., is in the market for a quantity of harrow teeth, bolts, etc., and desires to get in touch with manufacturers.

The Board of Trustees, Miami University, Oxford, Ohio, has awarded a contract to Boyajohn & Barr, Brunson Building, Columbus, Ohio, for a one-story addition to the industrial arts building, to cost about \$35,000. Herbert B. Briggs, Hartman Hotel Building, Columbus, is architect.

The Southern Railway Co., Washington, has plans under way for new locomotive and car repair shops at Chattanooga, Tenn., to cost \$750,000 with equipment. It is said to be considering the early rebuilding of the portion of its shops at Knoxville, Tenn., destroyed by fire Aug. 22, comprising coach and freight car repair shops, planing mill and other buildings, with loss of \$250,000 including machinery.

The Mills Equipment Co., Chattanooga, Tenn., has inquiries out for a steam shovel, Erie or similar make, $\frac{3}{4}$ -yd. capacity, crawler type.

The Common Council, McMinnville, Tenn., plans the installation of pumping equipment in connection with a proposed municipal waterworks for which bonds for \$65,000 have been approved.

The Yingling Brothers Co., Monroeville, Ohio, manufacturer of handles, etc., has awarded a contract to Christman Brothers, Bellevue, Ohio, for rebuilding the portion of its two-story and basement plant recently destroyed by fire, with loss of \$50,000 including equipment.

Bids will be asked soon by the Common Council, Watertown, Tenn., for pumping machinery and auxiliary equipment for a municipal waterworks, estimated to cost \$55,000. The Ambler Engineering Co., Old Dominion Building, Richmond, Va., is engineer.

The F. H. Lawwell Co., 1700 Mount Vernon Avenue, Columbus, Ohio, has plans for a two-story automobile service, repair and garage building, 66 x 145 ft., to cost approximately \$70,000.

Plans are being drawn by Schenck & Williams, Mutual Home Building, Dayton, Ohio, architects, for an addition for the Safe Cabinet Co., Marietta, Ohio, to cost \$750,000 with equipment. Electrical power equipment will be required.

St. Louis

ST. LOUIS, Aug. 31.

R. E. SCAMMELL, New England Building, Topeka, Kan., architect, will take bids at once for a two-story and basement automobile service, repair and garage building, 125 x 130 ft., to cost about \$100,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in the three-story and basement baking plant, 172 x 227 ft., to be erected by the C. J. Patterson Corporation, 3110 Graham Road, Kansas City, Mo., estimated to cost \$150,000.

Fire, Aug. 20, destroyed a portion of the plant of the Oklahoma Rig & Supply Co., Muskogee, Okla., manufacturer of oil-well machinery, with loss estimated at \$55,000 including equipment. It is planned to rebuild.

The Chandeysson Electric Co., 4092 Bingham Avenue, St. Louis, manufacturer of electrical equipment, will begin the erection of a one-story addition, 50 x 120 ft., to cost \$50,000.

The Board of Education, Wichita, Kan., has plans for a one-story manual training shop at the local high school, 31 x 77 ft. Schmidt, Boucher & Overend, Fourth National Bank Building, are architects.

The Moon Motor Car Co., St. Louis, has acquired a building adjoining its plant, totaling about 200,000 sq. ft., for the production of the new Diana straight-eight and Moon six-cylinder automobiles. Large increased output is to be arranged. Stewart McDonald is president.

The Common Council, Portageville, Mo., plans the installation of pumping machinery in connection with a proposed municipal waterworks and sewage system estimated to cost \$85,000.

The Kansas Gas & Electric Co., Wichita, Kan., has plans for a new one-story power station at Arkansas City, Kan., estimated to cost \$85,000 with equipment.

The Miller Boiler & Tank Co., 711 East Elm Street, Enid, Okla., will proceed with the erection of a one-story plant, 75 x 150 ft., for the manufacture of oil-well equipment, boilers, tanks and other plate specialties. The com-

pany is in the market for a radial drill, flanger, punches, power hack saw, shearing machine, and other tools. T. L. Miller is president.

The Common Council, Concordia, Kan., plans the installation of pumping machinery in connection with a proposed waterworks expansion program estimated to cost \$100,000. Charles A. Haskins, Finance Building, Kansas City, Mo., is consulting engineer.

The Salina Produce Co., Salina, Kan., will begin the construction of a new cold storage and refrigerating plant at Osborne, Kan., to cost about \$65,000 with equipment. H. E. Beisner is superintendent.

The Judson Engineering & Construction Co., 1811 Faraon, St. Joseph, Mo., is in the market for a complete dragline outfit.

The Citizens' Ice & Cold Storage Co., Sixth and Thomas Streets, Little Rock, Ark., contemplates extensions and improvements in its ice-manufacturing and cold storage plant, including the installation of additional equipment. A new cold storage warehouse will be built. J. H. Ford is superintendent.

The Arkansas Fertilizer Co., 2200 East Street, North Little Rock, Ark., will make extensions in its mill and install additional machinery.

Milwaukee

MILWAUKEE, Aug. 31.

MACHINE-TOOL business in this market during August showed an increase over the same month last year, according to most interests, yet was hardly equal to the average of the preceding three months. As the month comes to a close inquiry is growing more active, especially from automotive industries. Local foundries and machine shops are increasing production schedules materially and some new business is expected from these sources. Tractor manufacturers and the power farm machinery industry as a whole is in the best operating situation in several years and this portends greater buying activity.

The A. O. Smith Corporation, Milwaukee, has let contracts for the erection of a manufacturing addition, 180 x 520 ft., to be used principally for the production of cracking stills, refinery vessels, casing couplings for pipe lines and other similar oil field equipment. The Smith company is making extensive purchases of heavy bending rolls, arc welding equipment and other machinery. E. W. Burgess is construction engineer.

The Twin Device Mfg. Co., LaCrosse, Wis., has been formed by E. S. Fiedler, 925 South Third Street, to engage in the manufacture of a combination supercharger and air cleaner for automobile engines. Later other automotive devices will be put into production. Pending the erection of its own factory, the company has contracted with the Bump Paper Fastener Co., LaCrosse, to manufacture the products, and it will install some new equipment to accommodate the new line.

The Huebsch Mfg. Co., 368 Brady Street, Milwaukee, manufacturer of machinery and devices for laundries, dry cleaning and dyeing plants, etc., has acquired an existing building and has abandoned its plan of erecting a new plant at Thirtieth and Center Streets at a cost of \$75,000. It will, however, be in the market for considerable of the original list of new equipment. William O. Huebsch is secretary and general manager.

A. L. Seldenschwartz, architect, 290 Third Street, Milwaukee, acting for an unidentified client, let the general contract to the Coddington Engineering Co., local, for erecting a \$35,000 garage and service building, 54 x 120 ft., part two stories and basement, in Wauwatosa, Milwaukee County.

The Oshkosh, Wis., Board of Education is taking bids until Sept. 10 for the erection of a vocational school and recreation building, designed by Auler & Jensen, local architects, and estimated to cost \$300,000. The equipment will not be purchased until the building nears completion next spring. E. G. Beardmore is secretary of the board.

The Chicago, Minneapolis, St. Paul & Omaha division of the Chicago & North Western Railroad Co. let the contract to the Ernest M. Ganley Co., Inc., 2922 Oakland Avenue, Chicago, for erecting a new terminal building, including roundhouse, machine and service shop, turn table, etc., at Spooner, Wis. It will cost about \$50,000 with equipment.

The Twin Disc Clutch Co., 1500 Clark Street, Racine, Wis., manufacturer of clutches for motor vehicles and other machinery, has started work on the construction of a new

plant, the first unit of which will be 80 x 250 ft., one story, and cost about \$50,000 with equipment. An office building and an additional shop unit will be erected next spring.

The Modine Mfg. Co., Racine, Wis., manufacturer of radiators for automobiles, tractors, trucks, farm lighting plants, etc., is erecting an addition, 40 x 140 ft., one story and part basement, to increase both the production and storage space.

South Atlantic States

BALTIMORE, Aug. 31.

BIDS will be asked soon by the Flynn & Emrich Co., 305 North Holliday Street, Baltimore, manufacturer of stokers, for its proposed one-story addition, 90 x 360 ft., to be equipped in part as a foundry, estimated to cost \$75,000. W. S. Austin, Maryland Trust Building, is engineer.

The Baldwin Tool Works, Inc., Parkersburg, W. Va., is planning the establishment of a new branch plant at Chester, S. C., reported to cost \$25,000. L. E. Wilson is in charge.

Fire, Aug. 22, destroyed a portion of the plant of the Atlanta Showcase Co., 10-16 Foundry Street, Atlanta, Ga., with loss estimated at \$75,000 including equipment. It is planned to rebuild.

The Oliver-Carter Co., Wilmington, N. C., machinery dealer, has inquiries out for a forge blower, motor-driven, with $\frac{1}{4}$ to $\frac{1}{2}$ -hp. motor, single phase.

Pringle & Smith, Atlanta Trust Building, Atlanta, Ga., architects, have plans for a six-story automobile service, repair and garage building at 34 Cone Street to cost \$150,000 with equipment.

The Carolina Power & Light Co., Raleigh, N. C., is planning the erection of a one-story repair shop for traction cars, and car barn, estimated to cost \$85,000. P. A. Tillery is general manager.

The Georgia Ice Co., Savannah, Ga., is planning the installation of an ice-manufacturing plant in an existing building, with initial capacity of 60 tons per day. Albert M. Dixon is president; Louis C. Roessel is chief engineer.

E. M. Blanding, Sumter, S. C., is in the market for a wagon-loader or portable elevator for handling coal to trucks.

Fire, Aug. 21, destroyed the works of the J. & N. Motor Co., Fayetteville, N. C., and the Fayetteville Vulcanizing Works on adjoining site on Gillespie Street, with loss reported at \$40,000 including equipment. Rebuilding plans are under advisement.

The Columbus Electric & Power Co., Columbus, Ga., has acquired the plants and properties of the Georgia-Alabama Power Co., and the South Georgia Public Service Co., both operating at Albany, Ga., and vicinity. Extensions and improvements are planned, including the installation of additional equipment.

The Hackley Morrison Co., 1708 Lewis Street, Richmond, Va., machinery dealer, has inquiries out for a steam shovel mounted on crawlers, about $\frac{3}{4}$ -yd. capacity, full revolving, high lift, Erie type preferred; also for several two-wheel trailers, each with capacity of 2000 lb.

The Virginia Western Power Co., Harrisonburg, Va., is said to be arranging an appropriation of \$130,000 for extensions and improvements, including the installation of hydroelectric power equipment, line extensions, etc.

Bids are being asked until Sept. 12 by the General Baking Co., 342 Madison Avenue, New York, for its proposed plant at Baltimore, to include the installation of ovens, power equipment, conveying and other machinery, estimated to cost \$500,000. C. B. Comstock, 110 West Fortieth Street, New York, is architect.

The general purchasing officer, Panama Canal, Washington, is asking bids until Sept. 21 for two 2-revolution presses, nine duplex pumps, rubber insulated copper wire, galvanized wire cloth, globe valves, power cable, chain blocks, copper metallic steam hose, galvanized iron or sheet steel, bar copper, and other equipment. Panama circular 1693.

The Chesapeake & Ohio Railroad Co., Richmond, Va., has awarded a general contract to the M. R. Hanke Co., Cincinnati, for its proposed boiler and plate shop at Huntington, W. Va., to cost \$450,000 with machinery.

Forrest & Dunn, Inc., Norfolk, Va., recently organized, is said to be planning the establishment of a local ship-building and ship repair plant. J. S. Dunn, 211 Third Street, heads the company.

The Public Utilities Commission, Elizabeth City, N. C., plans the installation of pumping equipment in connection with proposed extensions and improvements in the municipal waterworks estimated to cost \$400,000.

The American Oil Co., Broad Creek Road, Portsmouth, Va., plans the early construction of a new storage and distributing plant to cost \$45,000 with equipment.

Gulf States

BIRMINGHAM, Aug. 31.

BIDS will be received by the United States Engineer, Florence, Ala., until Sept. 24 for motor-driven air compressors for installation in the power house at the Wilson Dam, Tennessee River.

The J. O. Heinze Cultivating Tractor Corporation, Bessemer Trust & Savings Building, Bessemer, Ala., is considering plans for new works for the manufacture of farm tractors. J. O. Heinze is head.

Fire, Aug. 27, destroyed a portion of the plant of the Texas Refining Co., San Antonio, Tex., with loss reported at \$350,000 including equipment.

The Alabama Power Co., Birmingham, will proceed with its proposed hydroelectric power development at Lock 18 on the Coosa River, near Wetumpka, Ala., designed for an ultimate output of 180,000 hp. A steel tower transmission line will be built. The entire project will cost close to \$10,000,000 with equipment.

The Eastern Texas Electric Co., Beaumont, Tex., operated by Stone & Webster, Inc., Boston, has acquired the Western Public Service Co., with plants and system at Dayton, Cleveland, Somerville, Tex., and other points. The new owner plans extensions and improvements and the installation of additional equipment. George H. Clifford is district manager.

The Jefferson & Northwestern Railway Co., Jefferson, Tex., plans to rebuild the portion of its local machine shops and locomotive repair plant destroyed by fire Aug. 16, with loss estimated at \$35,000 including equipment. The road is operated by the Clark & Boice Lumber Co.

The Alamo Iron Works, Inc., 130 Santa Clara Street, San Antonio, Tex., has filed plans for a one-story foundry to cost \$21,000 with equipment.

The Common Council, Punta Gorda, Fla., has tentative plans under advisement for a one-story municipal electric light and power plant to cost \$45,000 with equipment.

The Peninsular Motors Corporation, Marion and Jackson Streets, Tampa, Fla., has plans for a one-story service, repair and garage building, 135 x 175 ft., to cost \$75,000 with equipment. Leo M. Elliott, Tampa, is architect.

The Mississippi Power & Light Co., Greenville, Miss., plans the early rebuilding of the portion of its power house at Greenville partially destroyed by fire Aug. 22, with loss of \$25,000 including equipment.

The C. L. Capps Co., 1224 East Adams Street, Jacksonville, Fla., manufacturer of brass, bronze and iron specialties, plans the construction of a one-story machine shop and foundry on East Eighth Street.

The Board of Education, Dallas, Tex., is considering the installation of manual training equipment in its proposed East Dallas school at Akard and Royal Streets, estimated to cost \$1,000,000, for which preliminary plans are in progress. DeWitt & Lemmon, Southwestern Life Building, are architects.

The Apopka Novelty Works, Apopka, Fla., will proceed with the erection of a one-story woodworking plant near the line of the Atlantic Coast Line Railway, to cost approximately \$23,000 with machinery. J. O. Buck is general manager.

The Board of City Commissioners, Richardson, Tex., plans the installation of pumping machinery in connection with a proposed municipal waterworks to cost \$50,000. Bonds are being arranged.

The Miami Electric Light & Power Co., 41-47 Flagler Street, West, Miami, Fla., has plans for a two-story automobile service, repair and garage building to cost about \$85,000 with equipment.

The Fort Payne Utilities Co., Fort Payne, Ala., will take over and consolidate the Fort Payne Electric Co. and the Fort Payne Water Co. Permission has also been secured to dispose of a bond issue of \$250,000, a portion of the fund to be used for extensions and improvements.

The Skinner Machinery Co., Dunedin, Fla., manufacturer of packing-house machinery, etc., has acquired property at Haines City, Fla., and is said to be arranging for the removal of its plant here. Additional equipment will be installed.

The Middle West Utilities Co., Frost Building, San Antonio, Tex., has plans for extensions and betterments in its electric power house at Victoria, Tex., including remodeling of the existing station and the installation of additional equipment, estimated to cost \$350,000.

The Southern Ice & Utilities Co., 309 Dundee Street, Dallas, Tex., contemplates expansion in its ice-manufacturing and cold storage plant and the installation of additional machinery. It is arranging to increase its capital to \$3,000,000, a portion of the fund to be used for extensions. C. W. Dawley is president.

The Ocala Lime Rock Co., Ocala, Fla., plans extensions in its quarry properties and the installation of equipment to double, approximately, the present output. It has increased its capital from \$100,000 to \$250,000. C. E. Ireland is president.

Cleveland

CLEVELAND, Aug. 31.

THE Hudson Motor Car Co., Detroit, during the week placed 40 turret lathes and the Dayton Engineering Laboratories, Dayton, Ohio, 10 turret lathes, both orders going to a Cleveland manufacturer. Another local machine tool builder received an export order for 20 automatic screw machines for France. The Nickel Plate Railroad is understood to have lined up several of the smaller machines that were on its recent list. There is still a fair volume of activity in the Detroit territory in single machines and small lots. Business was rather quiet with Cleveland dealers during the week, but their volume of sales in August was fully up to that in July. Considerable forging and bolt heading machinery was sold the past week by the National Machinery Co., Tiffin, Ohio, to visitors who attended the company's machinery exhibition.

The American Steel & Wire Co., Cleveland, has placed an order for a 36 x 44-in. slidehead boring mill with the Niles-Bement-Pond Co.

The Bender Body Co., 6409 Barberton Avenue, Cleveland, has placed contract with the H. G. Saltmyer & Son, for a one-story top addition to a factory, 150 x 350 ft.

The Ferro Enameling Co., 4150 East Fifty-sixth Street, Cleveland, has placed contract with Philip Kirschner & Co., 2914 East Seventy-fifth Street, for a two-story, 23 x 54 ft. addition to its enameling room.

The Youngstown Foundry & Machine Co., 365 East Boardman Street, Youngstown, has placed contract for a one-story addition, 115 x 260 ft. Cranes, hoists, conveyors, molding machines, blowers, dust collectors and core ovens will be required. E. G. Parker is general manager.

The Vlcek Tool Co., 300 East Eighty-second Street, Cleveland, has awarded a contract to the Hunkin-Conkey Construction Co. for a one-story, 46 x 86 ft. machine shop and garage addition. F. J. Vlcek is president.

The Atlanta Foundry Co., West Sixty-ninth Street, Cleveland, has awarded a contract to David Gilchrist, Berea, Ohio, for a one-story, 30 x 100 ft. pattern shop and office building.

The Studebaker Sales & Service Co., North Main Street, Marion, Ohio, has plans for rebuilding its garage and service station destroyed by fire on Aug. 13 with a loss of \$60,000. A lathe, drill press, re boring machine, etc., will be required.

Indiana

INDIANAPOLIS, Aug. 31.

BIDS are being received by the Ames Shovel & Tool Works, Inc., Anderson, Ind., for its one-story addition estimated to cost \$50,000 with equipment. E. F. Miller, Farmers' Trust Building, is architect. Headquarters are in the Ames Building, Boston.

The Schaefer Mfg. Co., Franklin, Ind., recently organized, contemplates the establishment of a new plant at Albany-Decatur, Ala., for the manufacture of tables, chairs and other furniture.

The Board of Education, Indianapolis, plans the installation of manual training equipment in its proposed three-story and basement West Side high school, at Twelfth and West Streets, estimated to cost \$500,000, for which bids will be asked early in September. Vonnegut, Bohn & Miller, Indiana Trust Building, are architects.

The one-story addition to be erected at the plant of the Fairbanks-Morse Co., Twenty-first Street and Northwestern Avenue, Indianapolis, will be 30 x 36 ft., to be equipped as a machine shop. Contract for building has been let to Mothershead & Fitton, 542 North Meridian Street.

The Symons Brothers Co., Indianapolis, care of the Lamboy Co., Plankinton Building, Milwaukee, Wis., engineer, has plans under way for a new one-story foundry, 60 x 100 ft., for which bids will soon be asked.

The Inland Box Corporation, Anderson, Ind., has leased a one-story building at West Morris Street and the Belt Line Railroad, Indianapolis, 100 x 180 ft., for a new plant to manufacture paper boxes and containers. H. C. Kranert formerly connected with the Sefton Co., Anderson, manufacturer of kindred products, is president.

A power house will be installed in the proposed three-story and basement laundry to be erected by the Kraus Laundry Co., Indianapolis, for which bids will be taken at once. It will cost approximately \$100,000. Vonnegut, Bohn & Miller, Indiana Trust Building, architects.

The Board of Public Works, City Hall, Gary, Ind., has recently rejected bids for a proposed municipal sewage pumping plant, and will take bids on revised plans at an early date. It will cost about \$100,000 with machinery. Alvord, Burdick & Howson, 8 South Dearborn Street, Chicago, are engineers.

The Better Radio Products, Muncie, Ind., recently incorporated, will manufacture radio equipment. It is in the market for material and equipment. D. W. Owens is one of the associates.

The Warner Machine Co., Muncie, Ind., recently incorporated, has begun construction on a plant which will be equipped to do special machine work in automotive parts. E. O. Thomas is secretary.

Pacific Coast

SAN FRANCISCO, Aug. 26.

CONTRACT has been let by the Laher Auto Spring Co., 714 East Pike Street, Seattle, manufacturer of steel springs, to the Austin Co. for a one-story plant at Twenty-sixth and Magnolia Streets, Oakland, Cal., to cost approximately \$45,000.

The Byron Jackson Pump Co., Sixth and Carlton Streets, Berkeley, Cal., has awarded contract to George Wagner, Inc., 181 South Park Street, San Francisco, for extensions in its machine shop to cost about \$20,000.

Dodge A. Riedy, Pacific Building, San Francisco, architect, has plans for a two-story automobile service, repair and garage building to cost \$100,000 with equipment.

The Jones-Hewitt Mfg. Co., 203 Realty Building, Everett, Wash., organized to manufacture mechanical toys, plans to have its work done by contract.

The Pacific Gear & Tool Works, Inc., 1035 Folsom Street, San Francisco, has awarded a general contract to Barrett & Hilp, 918 Harrison Street, for a two-story addition to cost \$20,000. S. Helman, 57 Post Street, is architect.

The Lake Union Dry Dock & Machine Works, Seattle, has plans for a one-story foundry, 50 x 90 ft.

The Western Paper Converting Co., Salem, Ore., is asking bids for a one-story mill, 100 x 240 ft., reported to cost \$90,000 with equipment. The company is affiliated with the Oregon Pulp & Paper Co., Salem. E. A. O'Neill is general manager.

The Associated Oil Co., 79 New Montgomery Street, San Francisco, is considering rebuilding the portion of its refinery at Avon, Cal., destroyed by fire, Aug. 26, with loss reported in excess of \$500,000 including machinery. The machine shop, tool house, pumping station, portion of boiler plant and a battery of stills were destroyed.

Ashley & Evers, 58 Sutter Street, San Francisco, architects, have plans for a five-story and basement automobile service, repair and garage building on South Jessie Street, to cost about \$250,000 with equipment.

The Pacific Natural Gasoline Co., Pacific Mutual Building, Los Angeles, will build a new compressor plant and cooling tower at its works on the Laconia Boulevard.

The California Refrigeration Mfg. Co., Inc., 2005 San Fernando Road, Los Angeles, recently incorporated, will manufacture refrigerating machinery, both domestic and commercial. It will be in the market for thermostats, valves, fittings, copper tubing, brass and bronze bars, sheets and wire. F. A. Thompson is one of the heads.

Canada

TORONTO, Aug. 31.

WIDESPREAD interest has been created by the exhibits of the most recent types of machine tools at the Canadian National Exhibition which opened in Toronto Aug. 29. Exhibitors from many parts of the world have taken space and it is expected that the showing of the latest models will result in a general improvement in sales. Buying the past week was well up to previous levels. While dealers are looking forward to sev-

eral large-sized lists on new works account the greater part of current business is in units of one or two, but the total volume is better than it was a year ago. Electrical tools and equipment for power development plants furnish one of the strongest features of the market.

The Aluminum Co. of Canada, Ltd., has placed the following orders for equipment in connection with its new works at Chute-a-Caron, Que.: Canadian General Electric Co., 15 synchronous converters, each of 3600 kw. capacity; 12 step-down and step-up transformers, each of 25,000 kva. with a primary voltage of 154,000 volts, and 10 transformers each of 7500 kva. capacity. The converters will be the largest units of this type in Canada, and interesting features are incorporated for starting them automatically. The plant of the Aluminum Co. of Canada will be one of the largest industrial developments in Canada and is expected to ultimately require electrical apparatus of many times the capacity of the equipment covered by the present order. The proposed power plant will be capable of developing 750,000 hp.

The Cobalt Contact Co., North Cobalt, Ont., proposes to start work at once on a new plant there to have a capacity of 50 tons per day.

The Sterling Caskets, Ltd., McDonnell Square, Toronto, has started preliminary work in connection with a \$40,000 manufacturing plant. Some contracts, including equipment, are still to be let.

D. Cream, Ltd., 953 St. James Street, Montreal, has the millwork contract for a \$100,000 addition to the plant of the Sherwin-Williams Co., Ltd., Atwater Avenue, Montreal. Other contracts are still to be let.

The Ontario Gypsum Co., Canada Cement Building, Montreal East, will erect a plant to cost \$200,000. Canadian Vickers, Ltd., Maisonneuve, Que., have the structural steel contract.

The Canadian National Railways, Champlain Market, Que., will build an addition to the shops at Limouliou, Que., to cost \$500,000.

R. Morrisette, city engineer, Cap de la Madeleine, Que., is receiving bids until Sept. 8, for one stage pump 8-in. x 8-in., 1200 gal.; one stage pump, 6-in. x 4-in., 500 gal.; head 75 ft. and 250 ft.; motors, gages and piping are also to be purchased.

Foreign

THE Ford Motor Co., Detroit, will increase the facilities of its branch assembling plant at Mexico City, Mex., and will install equipment for body manufacture, parts and other operations, including enameling, etc.

The Johnson Motor Co. of New York, Inc., 4 West Sixty-first Street, New York, has an inquiry from its agent at Athens, Greece, desiring to get in touch with American manufacturers of motors, from 3 hp. to larger capacity, for use in connection with water pumps, as well as for service in small workshops.

The North Portugal Waterfall Co., Lisbon, Portugal, has tentative plans for a hydroelectric power development on the Cavado River and its tributary, the Rabagao River, near Oporto. The project will consist of a series of power stations.

The American Chamber of Commerce in France, 32 Rue Talbott, Paris, has received an inquiry (17-3144) from a company in Paris, desirous of getting in touch with American manufacturers of tools and hardware products.

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Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

THE following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE, under the general headings of "Iron and Steel Markets" and "Non-Ferrous Metals."

Bars, Shapes and Plates		Per Lb.
Bars:		
Refined iron bars, base price	.....	3.24c.
Swedish charcoal iron bars, base	7 00c. to	7.25c.
Soft steel bars, base price	.....	3.24c.
Hoops, base price	.....	4.49c.
Bands, base price	.....	3.99c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger, base	.....	3.34c.
Channels, angles and tees under 3 in. x ¼ in. base	.....	3.24c.
Steel plates, ¼ in. and heavier	.....	3.34c.

Merchant Steel		Per Lb.
Tire, 1½ x ½ in. and larger	.....	3.30c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	.....	3.65c.
Toe-calk, ½ x ¾ in. and larger	.....	4.20c.
Cold-rolled strip, soft and quarter hard	.....	7.00c.
Open-hearth spring steel	4.50c. to	7.00c.
Shafting and Screw Stock:		
Rounds and hex	.....	4.00c.
Squares and flats	.....	4.50c.
Standard tool steel, base price	.....	15.00c.
Extra tool steel	.....	18.00c.
Special tool steel	.....	23.00c.
High-speed steel, 18 per cent tungsten	.....	70c.

Sheets		Per Lb.
Blue Annealed		
No. 10	.....	3.89c.
No. 12	.....	3.94c.
No. 14	.....	3.99c.
No. 16	.....	4.09c.

Box Annealed—Black		Per Lb.
Soft Steel	Blued Stove	Pipe Sheet
C. R. One Pass	Per Lb.	
Nos. 18 to 20	3.70c. to 3.95c.	.....
Nos. 22 and 24	3.75c. to 4.20c.	4.35c.
No. 26	3.80c. to 4.25c.	4.40c.
No. 28*	3.90c. to 4.35c.	4.50c.
No. 30	4.10c. to 4.55c.	.....

Galvanized		Per Lb.
No. 14	.....	4.00c. to 4.45c.
No. 16	.....	4.15c. to 4.60c.
Nos. 18 and 20	.....	4.30c. to 4.75c.
Nos. 22 and 24	.....	4.45c. to 4.90c.
No. 26	.....	4.50c. to 5.05c.
No. 28*	.....	4.90c. to 5.35c.
No. 30	.....	5.40c. to 5.85c.

*No. 28 lighter, 36 in. wide, 20c. higher per 100 lb.

Welded Pipe		Wrought Iron	
Standard Steel	Black Galv.	Black Galv.	
½ in. Butt....	46 29	½ in. Butt....	4 +19
¾ in. Butt....	51 37	¾ in. Butt....	11 +9
1-3 in. Butt....	53 39	1-1½ in. Butt.	14 +6
2½-6 in. Lap..	48 35	2-in. Lap....	5 +14
7 & 8 in. Lap..	44 17	3-6 in. Lap..	11 +6
11 & 12 in. Lap.	37 12	7-12 in. Lap.	3 +16

Bolts and Screws	
Machine bolts, cut thread, 40 and 10 per cent off list	
Carriage bolts, cut thread, 30 and 10 per cent off list	
Coach screws, 40 and 10 per cent off list	
Wood screws, flat head iron,	
72½, 25, 10 and 5 per cent off list	

Steel Wire		Per Lb.
BASE, PRICE† ON NO. 9 GAGE AND COARSER		
Bright, basic	.....	4.25c.
Annealed, soft	.....	4.50c.
Galvanized, annealed	.....	5.15c.
Coppered, basic	.....	5.15c.
Tinned, soft Bessemer	.....	6.15c.

†Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire	
BASE PRICE	
High brass sheet	19½c. to 20½c.
High brass wire	19½c. to 20½c.
Brass rods	16½c. to 17½c.
Brass tube, brazed	27½c. to 28½c.
Brass tube, seamless	23½c. to 24½c.
Copper tube, seamless	24½c. to 25½c.

Copper Sheets	
Sheet copper, hot rolled, 22½c. to 23½c. per lb. base.	
Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.	

Tin Plates		Coke—14x20	
Bright Tin	Grade	Grade	Prime Seconds
	"AAA"	"A"	
	Charcoal	Charcoal	
	14x20	14x20	
IC..	\$11.25	\$8.85	80 lb.. \$6.15 \$5.90
IX..	12.85	10.85	90 lb.. 6.30 6.05
IXX..	14.40	12.55	100 lb.. 6.45 6.20
IXXX..	15.75	13.85	IC.. 6.65 6.40
IXXXX..	17.00	15.05	IX.. 7.85 7.60
			IXX.. 9.00 8.75
			IXXX.. 10.35 10.10
			IXXXX.. 11.35 11.10

Terne Plates	
8 lb. coating, 14 x 20	
100 lb.	\$7.00 to \$8.00
IC	7.25 to 8.25
IX	8.25 to 8.75
Fire-door stock	9.00 to 10.00

Tin	
Straits, pig	60c.
Bar	65c. to 67c.

Copper	
Lake ingot	16½c.
Electrolytic	16½c.
Casting	16 c.

Spelter and Sheet Zinc	
Western spelter	9½c.
Sheet zinc, No. 9 base, casks	12½c., open 13c.

Lead and Solder*	
American pig lead	10c. to 12½c.
Bar lead	12c. to 13c.
Solder, ½ and ½ guaranteed	40c.
No. 1 solder	37c.
Refined solder	30½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal	
Best grade, per lb.	75c. to 90c.
Commercial grade, per lb.	35c. to 50c.
Grade D, per lb.	25c. to 35c.

Antimony	
Asiatic	20c. to 21c.

Aluminum	
No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	32c. to 35c.

Old Metals	
Business is very quiet, prices in several items having receded. Dealers' buying prices are as follows:	

	Cents
	Per Lb.
Copper, heavy crucible	12.00
Copper, heavy wire	11.75
Copper, light bottoms	9.50
Brass, heavy	7.25
Brass, light	6.00
Heavy machine composition	9.00
No. 1 yellow brass turnings	8.50
No. 1 red brass or composition turnings	8.25
Lead, heavy	8.25
Lead, tea	6.75
Zinc	4.50
Cast aluminum	17.50
Sheet aluminum	17.50

